CX400 Technical Manual

Rev 1.00

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1. GENERAL INTRODUCTION

Scope:

This Technical manual covers the information for properly maintaining SATO CX 400 Label Printer, such as, " Printer specification","Trouble Shooting Guide", "Option Accessory Installation "," Spare Parts List", "Set up & Diagnosis", "working theorem" and so on. For the issues related to soft ware, please refer to "Programmer Manual"

Related manuals:

- User's manual
- Programmer's manual

2.Printer Specification

2.1 Electronic

CPU ……... Hitachi SH7034
C LOCK …… 20 M Hz (26 MIPS)
Panel …… 1 Green LED for Power & 1 Red LED for Error Indication, 1 Feed Button
DRAM…….. 1 M word
Flash ROM ……. 1 M word (2 x 1 M byte)
Sensors…… 1. I-mark(Reflective) and Gap(See-Through) Sensor for detecting the index on media
2. Ribbon, Dispenser Sensor
3. Printer Head Open Sensor
Power Input……. RMS 19V AC Input to the Power Jack on Printer
Power Consumption in printing ……. 70 Watt .
Power Consumption in Standby…… Less than 2 Watt
Regulatory Approvals…….. FCC Class B,CE, TUV,CCC,UL
Additional Memory ……. 2 M or 4 M byte Flash ROM

2.2 Printing

Method	**:**	**Thermal Transfer and Direct thermal**
Resolution	**:**	**203 dots/inch (8 dots/mm)**
Max print width	**:**	**4.1"(104mm)**
Max print length	**:**	**1270 mm (50 inches)**
Print speed	**:**	**1,2,3,4 inches per second specified by SATO printer command .**

This Printer might slow down the printing speed to 3~2 IPS or pause printing upon Stepping Motor or Print Head is over-heat. Printing will be resumed to the specified speed when Motor or Print Head is cooled down again. Normally the mechanism for over-heat protection will be NOT activated before 2 rolls of labels (more than 150 meters long.) are printed out consecutively in 4 IPS mode.

2.3 Fonts

Text fonts: **Compatible with all SATO CL printers Code Page 858,**
Others available. U;S; M; WB; WL; XU; XS; XM; XB; XL; OCR-A/B;
Outline Font (50 ~ 999 dots)

Rotation: **0, 90, 180, 270 degree, 4 direction rotation**

2.4 Bar code

UPC A/E, EAN8/13, EAN128, Code39, Code93, MSI, I25, M25, Postnet Bookland, Code 128, UCC 128, Codabar, MaxiCode, PDF417

2.5 Graphic

Formats: SATO Hex/Binary
Rotation: 0°; 90°; 180°; 270°

2.6 Media

Media type :
Direct Thermal - direct thermal paper or vinyl, visible light and infrared scannable label, tag stock, with various adhesives.
Thermal transfer - all above media, plus thermal transfer paper

Max Label Roll Diameter : 127mm (5")
Label Roll Core Diameter : 19.05 mm (0.75")
Min. Inter-Label Gap : 2 mm (0.08")
Max. Inter-label Gap : 25.4 mm (1")
Media Sensor:

1. **Either "Reflective Sensor" or "Gap/I-mark Sensor" can be selected by user.**
2. **Located in the left side of Label Guide. In other words, the sensors are moved with the label width.**
3. **Gap/I-mark Sensor is for the Labels with Die-Cut gap or Notched Index .**
   Reflective Sensor is for the Labels with Eye-Mark, Die-Cut gap.

2.7 Operating environment

Electrical: AC 90VAC to 250VAC 50-60 Hz
Operating: +5 ~ 38°C (25 ~ 85 RH, non condensing)
Storage: -20 ~60°C(25 ~ 85 RH, non condensing)

2.8 Physical dimension

Weight : 3.67kg (Transformer Adaptor Included)
Size : 197mm (7.76") x 257mm (10.2") x 164mm (6.5")

2.9 Communication specifications

SATO CX-400 Label printers send and receive messages through either serial or parallel communication interface. Printer will automatically monitor these two ports for receiving commands/data from Host.

2.9.1 Serial interface specification

The serial interface of CX400 printer is a RS-232C port with standard 9-pin (DB9-S) connector located at the rear of the printer. CX400 printers employed "Flow Control" mechanism with either RTS/CTS or X-on/X-off (control characters are DC2 and DC4).
The parameters can be set by printer are as followings,

Speed: **9600, 19200 or 38400 baud**
Parity: **Odd, Even, or None**
Data Bits: **7 or 8 bits**
Stop Bit(s) **1 or 2 bits**
Default parameters: 9600 bauds, no parity, 8 data bits, 1 stop bit

Pin	Signal	Description
1	**Carrier Detection**	"Shorted with Pin 9" (RI) or" Open" count on R94 existed or not 0 Ohm on R94 ➔ Shorted with Pin 9 (+5 V) No Resistor on R94 ➔ Pin 1 is N.C.
2	**Received Data, RxD**	Input. Serial "Received Data"
3	**Transmitted Data, TxD**	Output. Serial "Transmitted Data".
4	**Data Terminal Ready, DTR**	Always maintai n at high state (+10 V)
5	**GND**	Signal Ground
6	**Data Set Ready, DSR**	Shorted with Pin 4 (DTR)
7	**Request to Send ,RTS**	Output. Used as the control signal for "H/W Flow Control "
8	**Clear to Send , CTS**	Input. Used as the control signal for "H/W Flow Control"
9	**Ring Indicator, RI**	"5 Volt" or "N.C. selected by JP1 on board "0 ohm " puts on JP1 ➔ "5 V" No resistor on JP1 ➔ NC

Table 2.1

Note:
CX400 printers require a "null modem" cable (pin 2-3 and 7-8 crossed wiring) while connecting to another DTE Device, like PC.

2.9.2 Parallel interface specification

This port complies with IEEE-1284 Compatibility mode(Also named as Standard Parallel or Centronic Port).

2.9.3 Pin assignment and description

Pin	Signal	Description
1	/STROBE	Input. Active low pulse used to transfer data into the printer.
2~9	D1~D8 Pin 2 → D1.. Pin 9 → D8	Data Input
10	Acknowledge, /ACK	Output. Active low pulse indicates that data has been received and the printer is ready to accept more
11	BUSY	Output. A high signal indicates that the printer cannot receive data.
12	Paper End, PE	Output. A high signal indicates that the printer is out of paper
13	Select (high)	Always maintain at +5 V
14	Supply Ground	N.C.
15	Oscillator Transmit	N.C.
16	Logical Ground	GND
17	Chassis Ground	GND
18	+5 Vdc	N.C.
19~30		GND
31	Input Prime (low)	N.C.
32	/FAULT	Output. A low signal indicates that the printer is in error state
33~36	-	N.C.

Table 2.2

3. CONTROLS AND INDICATORS

3.1 Front panel

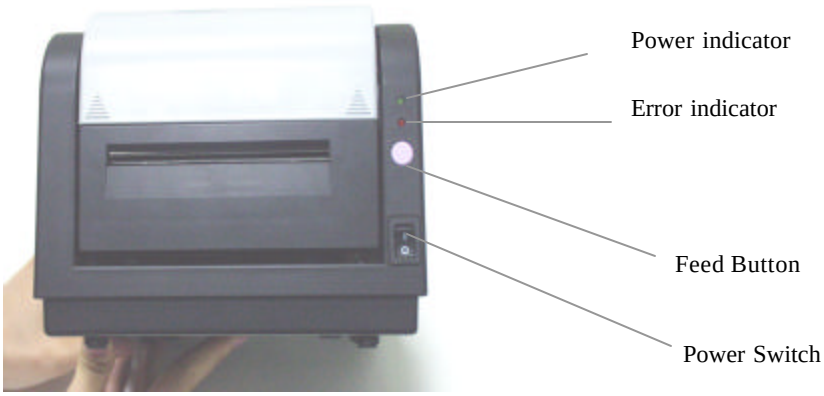


Figure 3.1

POWER indicator
The POWER indicator remains ON when the AC power switch is in ON position except " Ribbon Out", "Media Out" , or other errors occur. It will blink when those errors are detected.

ERROR indicator
It will start to blink while "Media Out", "Media Gap Not Found", "Ribbon Out " or other errors being detected.
The followings list the meaning for diverse LED indication,

1. ERROR LED is OFF and POWER LED is ON while there are no errors detected by Printer.
2. "ERROR &POWER LED synchronously blinking" indicate "Media Error", either "No Media"or " Media Index not Found"
3. "ERROR & POWER LED reversely blinking" indicates "Ribbon Out".
4. "POWER LED ON and ERROR LED blinking , longer OFF period than ON period" indicates "Print-head Open".
5. "POWER LED ON and ERROR LED blinking at the same ON and OFF period" stands for other errors , like RS232 communication error.

FEED Key

1. Pressing the button during start-up, a test label will be printed out.
2. Pressing the button during printing will cause the printing to be paused.
3. To feed a blank label or print the last printed label.
4. To reset this printer to factory settings.

Power switch
Turn on/off printer.

3.2 Rear panel

Centronics connector (parallel port)
For parallel port connection . Mostly it is connected to the printer port of a PC .

RS232 connector (serial port)
For serial port connection . Mostly it is connected to the COM port of a PC .

Power Jack
To connect the Power Plug from Power Adaptor

USB
Reserved

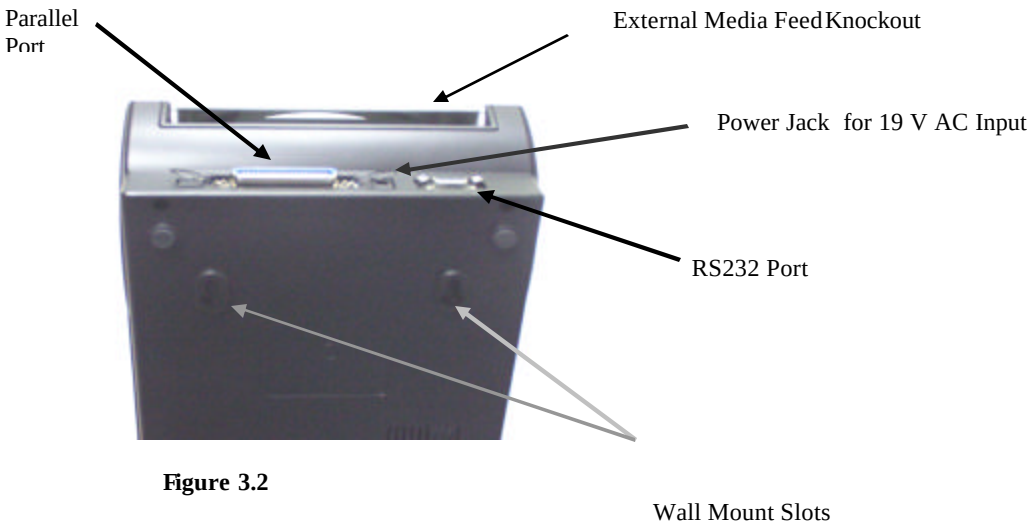


Figure 3.2

4.Optional Accessories

4.1 Cutter mechanism

Optional cutter for cutting labels, tags or tickets . Back feed is included for cutting .

4.2. FONT module

Font module, which is used to store special font such as Chinese, Korean, Japanese characters.
The total size of Font Module could be 4 M or 2 M bytes.

4.3. Dispenser

Dispenser provides the automatic peel-off function .

5. Self-Diagnosis and Calibration

5.1 Self Diagnosis

A simple Self-Diagnosis could be activated by either a group of Printer Commands or Feed Button.

A. By Commands

1. Edit a text file that includes the following commands.

   <ESC>A
   <ESC>CT
   <ESC>Z

2. Send the file to printer. Then a " Self Test Label" will be printed out.

B. By FEED Button

1. Press and hold the FEED button till the printer starting to print "Self Teest Label" shown on Fig. 5.1.
2. Release the FEED button.
3. Cycle printer power to resume this printer to normal mode.
   (It is necessary to cycle Printer Power since the printer will be in "HEX dump mode" After the test label is printed out)

The Contents and Information in "Self Test Label" are as followings,

1. Image Pattern
   Used to check the print head, motor, roller and related mechanical parts.

2. Version Information
   This includes date code, firmware version and check sum value. Note that the check sum value should be 0000 otherwise it implies there are error bits in the onboard flash memory.

3. RS232 Protocols
   It contains baud rate, parity, data bit number and stop bit number.

4. Darkness
   Default darkness. It can be overwritten by a darkness command.

5. Accumulated Print length
   It keeps the length printed in inches. By this you may check the print head warranty. But it cannot be reset when you replace the print head or any components.

6. Print Speed
   Default print speed in IPS. The factory default is 3 IPS.

7. Media Sensor Used
   It specifies the sensor type used for media, I-mark(Reflective), Gap (See-Through) or disabled. Select the proper one for your media by command or through the application software.

8. Print Mode
   It is either TT (Thermal Transfer with ribbon) mode or DT (Direct Thermal without ribbon) mode.

9. Tear-Off Option
   It indicates whether "back feed" is taken for tearing off the printed labels.

10. Control Code Definition
    It shows the control code set. The control codes affect the commands and special controls.

11. Pitch Offset
The offset value affects the start print position.

12. Accumulated Cut Count
This is used to check the cutter life.

13. Memory Slot I
This is the onboard non-volatile memory, flash memory used to store the graphic, font objects. The size of memory slot I is 512K bytes.

14. Memory Slot II
This is the optional non-volatile memory, flash memory used to store the graphic, font objects. The size of memory slot II is either 2M or 4M bytes.

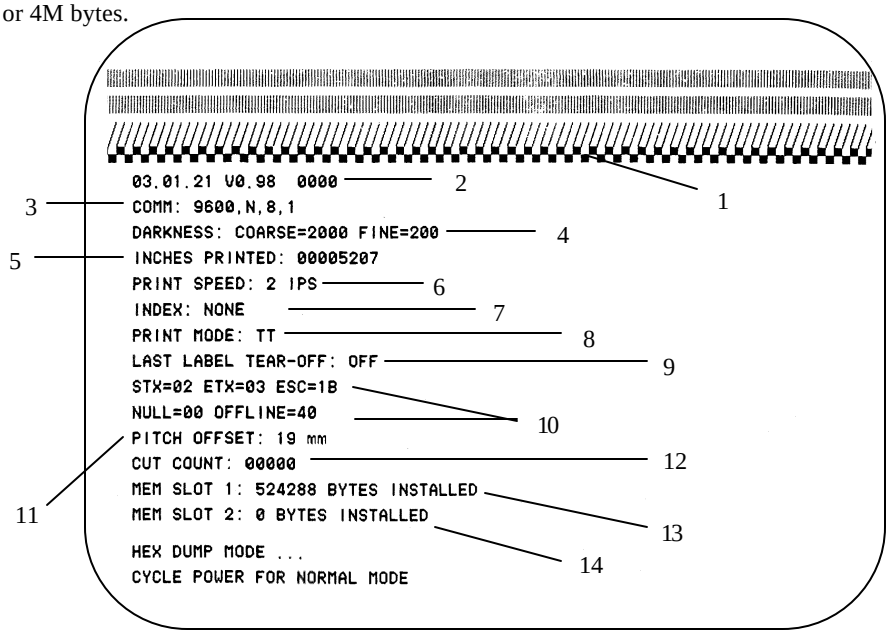


Figure 5.1

< Important !>
The printer will be in hex dump mode after printing the self-test label. It cannot print normal labels in hex dump mode. The printer will return to normal operation only you cycle power for restarting this printer.

5.2 Calibration

CX400 unit had been calibrated at the factory for using with SATO standard ribbon and media. Other ribbon/media combinations may or may not index properly with these settings. You might need to perform various calibrations to adapt the variance caused by the particular Media & Ribbon.

5.2.1 To Calibrate Media Sensor

You might need to perform “Media Sensor Calibration” if Printer frequently skips a blank label, the variance for “Printing position” in every label is too obvious, or the image on printed label is not located as what you set.
The Calibration for media sensor can be done by clicking the Calibration Buttons in the Label Wizard CX software or the Windows Printer Driver. If it is not convenient for you to calibrate Media Sensor with those application software, this sensor calibration also can be performed by directly sending “ Printer Commands for Media Sensor Calibration” to printer.

1. Install well the Media and Ribbon (TT mode)
2. You can calibrate the Media Sensor with Application S/W.

Or you are also able to directly send out a group of commands to printer for calibrating the media sensors in either I-mark(Reflective)or Gap(See-Through) mode. Two groups of commands for Bar & Gap mode sensor are listed below,

<In Reflective mode >

<ESC>A
<ESC >CI1
<ESC>CA
<ESC>Z

< In Gap mode >

<ESC>A
<ESC>CI2
<ESC>CA
<ESC>Z

3. Once the Media sensor calibration is activated in step 2, the printer will feed several labels (6 inches) to perform this calibration. After this printer completely stops feeding label, this calibration had been well.

< note 1 > < ESC> = 0x1B,
< note 2 > The ribbon must be installed in the printer when calibrating in the thermal transfer mode.

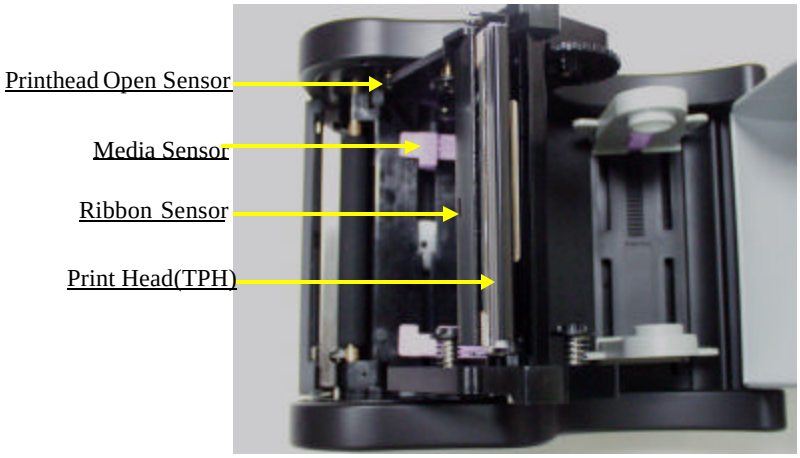


Figure 5.2

5.2.2 Calibration for Ribbon Sensor

The calibration for Ribbon sensor might need to be performed while the particular Ribbon & Media you installed makes this printer fails to detect ribbon out or the end of ribbon. Actually it is not necessary to perform this calibration except the installed Ribbon & Media are very particular.
The calibration for ribbon sensor is used for the printer to keep the characteristics of ribbon sensor, ribbon and media. The printer always checks the ribbon existence during printing under TT (thermal transfer) mode. Once the printer mis-detects the ribbon you must make a ribbon calibration for them. Two steps are required to do it.

Step 1 ➔ To Install both Ribbon and Media , then

1. Send a group of commands to the printer.
   <ESC>A
   <ESC>&I1
   <ESC>Z
2. Wait for five seconds to make sure the printer to finish checking.

Step 2 ➔ Remove the Ribbon and Install the Media,then

1. Send a group of commands to the printer.
   <ESC>A
   <ESC>&I0
   <ESC>Z
2. Wait for five seconds to make sure the printer to finish checking.

After Step1&2 have been done the calibration ribbon sensor is completed.

<Note>You can also put the end-mark ribbon (in general it is in silver color) under the ribbon sensor (right under print head) at step B.

5.2.3 Calibration for Dispenser Sensor

The calibration for dispensor sensor is used for the printer to keep the characteristics of dispensor sensor and media. The printer checks the label existence after printing, when the printed label is removed the printer continues printing for the next label automatically. Once the printer mis-detects the label you must make a calibration for them. Two steps are required to do it.

Step 1 ➔ Putting a label on the plastic plain under the dispenser sensor, then

1. Send a group of commands to the printer.
   <ESC>A
   <ESC>&P1
   <ESC>Z
2. Wait for five seconds to make sure the printer to finish checking.

Step 2 ➔ Removing the label from the dispenser sensor, then

1. Send a group of commands to the printer.
   <ESC>A
   <ESC>&P0
   <ESC>Z
2. Wait for five seconds to make sure the printer to finish checking.

After both above steps 1&2 have been done the calibration for dispenser is completed.

6. OPTIONAL PARTS INSTALLATIONS

CAUTION

The printer electronics are susceptible to static discharge . Wear an anti-static wrist and attach it to the printer chassis

6.1 Cutter Installation

1. Turn off the power switch
2. Loose the 2 screws(B) to take off "Peeler Cover"(75).
3. Loose the screw (E) which screwed "ANG-PEELER" (28) to "Printer Chassis"(30).
4. Push "ANG-PEELER"(28) to right then take it out.

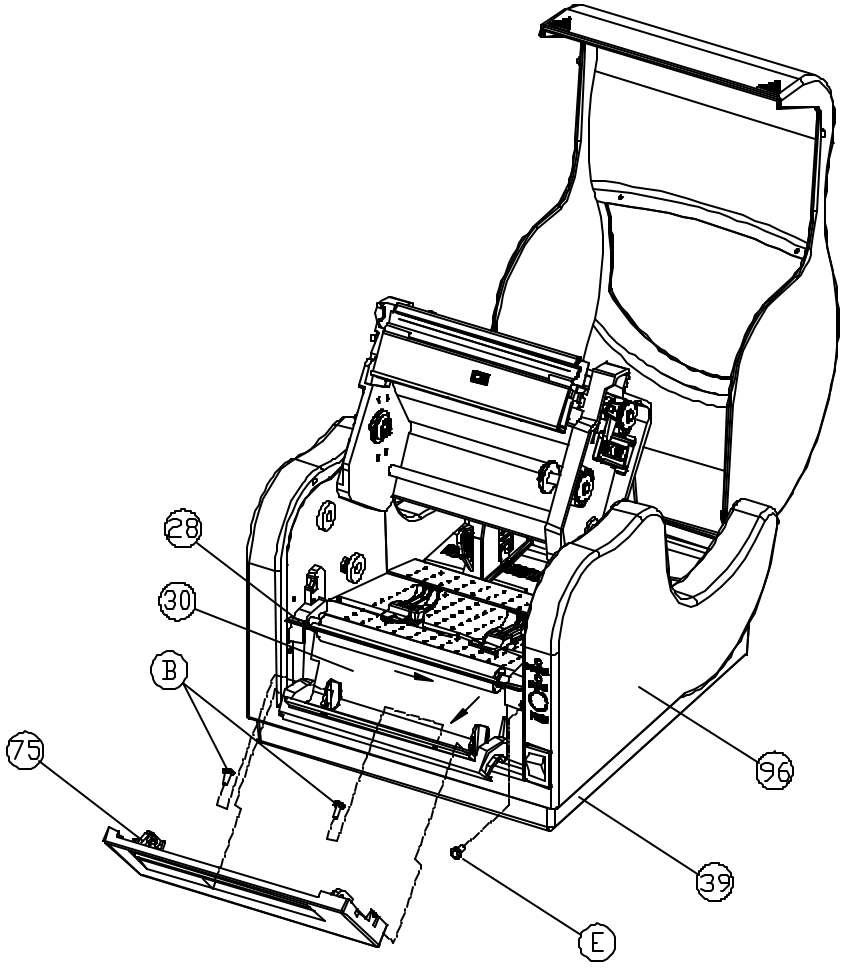


Figure 6.1

5. Loosethe 2 screws(I) on Printer Bottom
6. Pull out the front side of "Middle Cover" (96) then remove it from "Bottom"(39)
7. Unplug "Power Switch" from "Power Cords" then take out "Middle Cover"(96)
8. Put "Baby Board" to JP29 on the main board

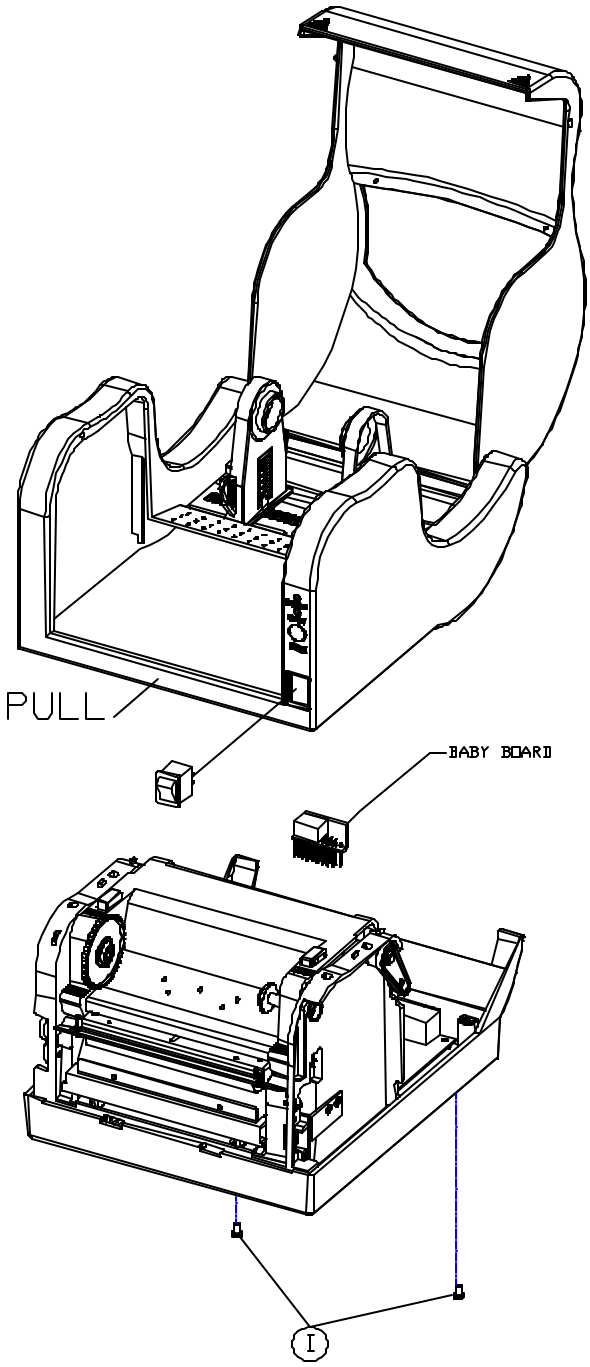


Figure 6.2

9. Let the 2 Power Cords go through the switch hole on “Middle Cover”, then plug “Power Cord” to Power Switch.
10. Pull the front side of “middle cover” to put it back on “Bottom” (39).
11. Screw up the 2 screws(I) on Printer Bottom.
12. Plug the cutter cable to “External Connector” as shown on Figure 6-3.
13. Insert “Cutter Module” into the slot on “Printer Chassis”(30) where you took off “ANG-PEELER”(28) in “step 4”.
14. Screw “Cutter Module “ on “Printer Chassis”(30) wit h screw (B).
15. Click back “Print Head” and Click back “Top Cover”
16. After cutter had been installed well with the above steps, you still need to set the E2PROM through commands.
    <esc>A
    <esc>CK1
    <esc>Z

    Once the cutter is uninstalled you also need change the setting by commands or make a reset from panel.
    <esc>A
    <esc>CK0
    <esc>Z

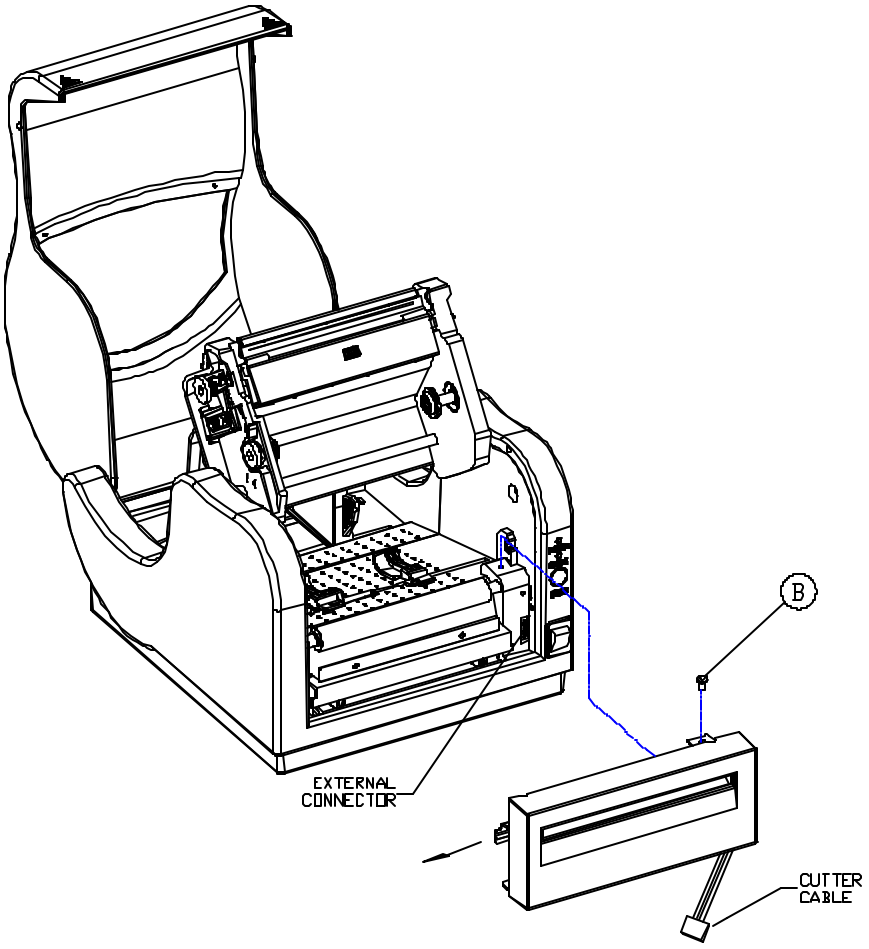


Figure 6-3

6.2 Dispenser installation

1. Turn off the power switch.
2. Loose the screw (E).
3. Loose the 2 screws(B) to take off "Peeler Cover"(75).

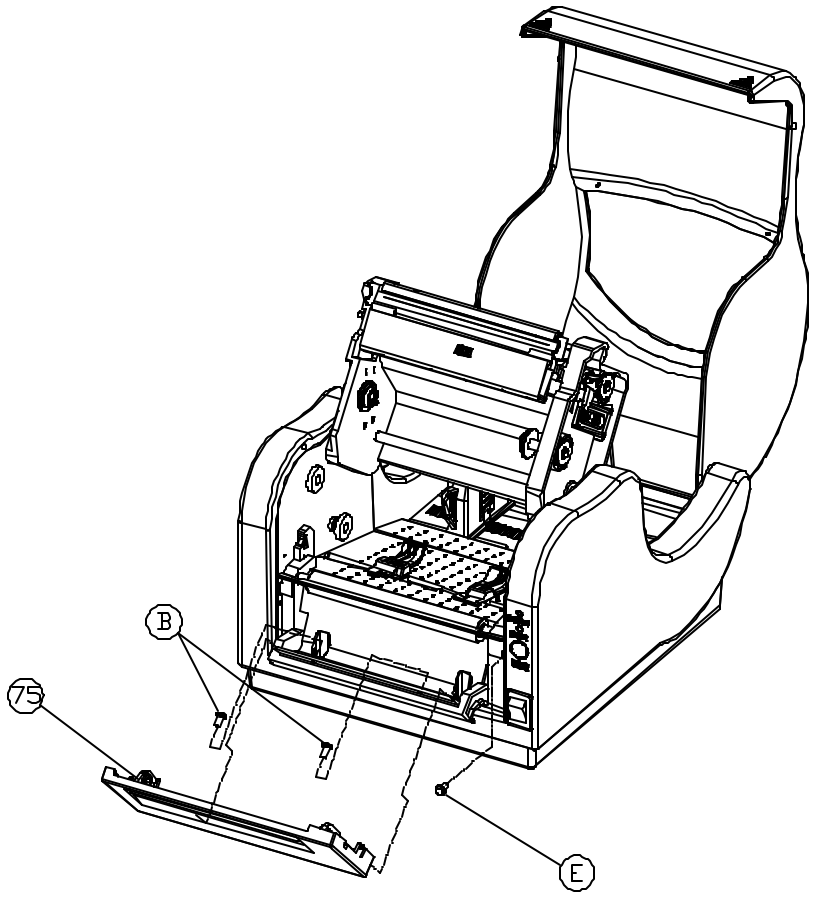


Figure 6.4

4. Plug "Sensor cable" of Dispensor Module into "External Connector"
5. Screw Dispensor Module on "Printer Chassis" with 2 Screw(B)
6. Screw "Sensor Cable" on "Printer Chassis " with the screw (E)
7. Click back "Dispensor Module".
8. Click back "Printer Head " & "Top Cover"

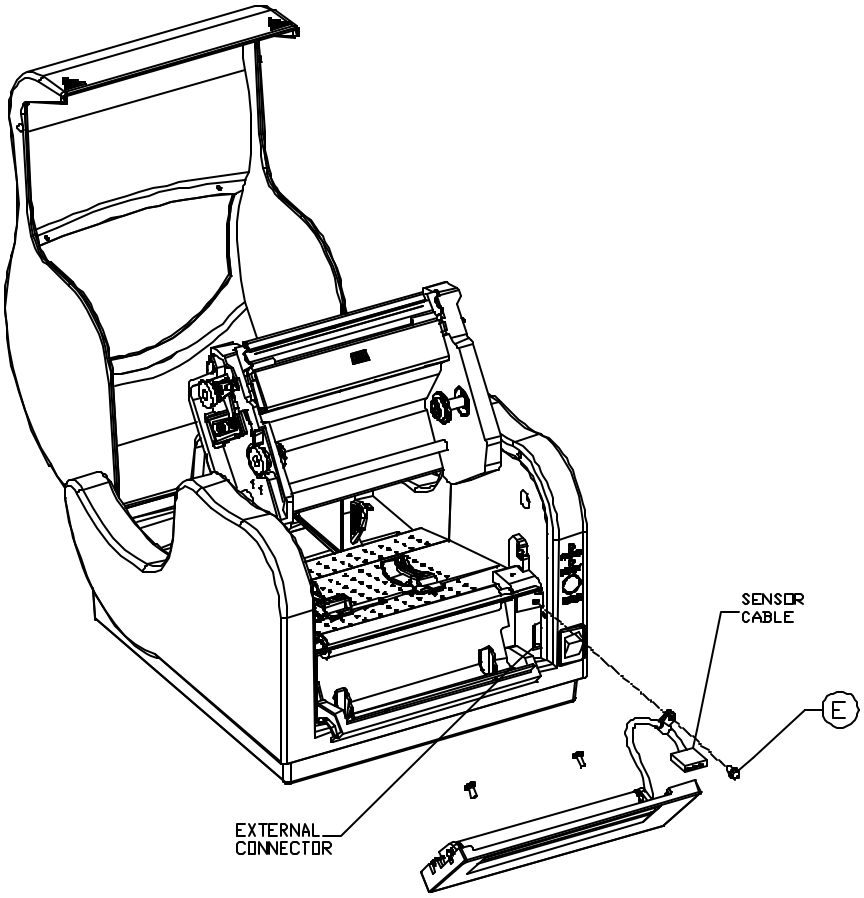


Figure 6. 5

7. FIRMWARE UPGRADING

The firmware in Printer CX400 is able to be upgraded through the Centronic port on printer. The following sub-section describe how to upgrade firmware in normal and corrupted case

7.1 Unzip Firmware File

This diskette(ZIP file) contains the related files and data that you may change or upgrade the firmware. Before changing the firmware decompress the file first.

1. C:\>MD SATO
2. C:\>CD SATO
3. C:\SATO >COPY A:README.TXT
4. C:\SATO >A:PKUNZIP A:CX400_Vx.xx.ZIP ➔ Decompress all the files for upgrading F/W
   (Where "x.xx" is version number ,e.g. 1.01)

7.2 Upgrade Firmware in Normal Case

1. Turn on the printer and wait for 3 seconds.
2. Set PC to MS-DOS .
3. CD C:\SATO (Change the Directory you made in 8.1 section)
4. Enter "SATO" on the DOS prompt "c:\SATO"
5. Wait a moment (2~3 minutes) till "Power & Error LED" are synchronously blinking for completing F/W upgrade. Then cycle the printer power to restart this printer.
6. When up date successfully, please follow the reset procedure listed in section 5.1 to reset this printer and verify if this upgrade is successful or not. Specially the check sum in the label, which were printed out during reset, should be 0000.

7.3 Upgrade Firmware in Corrupted Case

In very abnormal case, the Boot-Up program located at BOOT sector of Flash ROM in CX400 might be corrupted(Supposedly it is impossible to happen.). This will cause Printer to be unable to perform F/W upgrade with the above normal way. In this case you might need to refer below to upgrade the Firmware.

1. Refer to step 1~2 and Step 5~8 in section 8.4.3 to disassemble this Printer till the expansion slot (JP11)& JP5 is accessible.
2. All the jumpers on JP5 (Located beside Expansion slot,JP11, and U8,U9) should be put on BOOTER side.
3. Put "Booter Module"(It is the normal Font Card with "Booter Firm Ware" but not with Fonts.) on JP11.
4. Turn on the printer and wait till POWER LED lights up.
5. Set PC to MS-DOS.
6. CD C:\SATO (Change the Directory you made in 7.1 section)
7. Enter "SatoBoot" on DOS Prompt "c:\SATO" .
8. Wait around 1 minute till Power" & "Error" LEDs are synchronously & slowly blinking. Then turn off this printer.
9. Put all the jumpers on JP5 to be at NORMAL side again.
10. Remove "Booter Module" from JP11.
11. Refer to section step 19~21 and step 24~25 in section 8.4.3 to assembly this printer.
12. Follow the reset procedure listed in section 5.1 to reset this printer and verify if this upgrad being successful or not. Specially the check sum in the label, which printed out during reset, should be 0000.

Note:

1. It is prohibited to run under Windows DOS for upgrading F/w in the above 2 modes

2. DO NOT TURN OFF the printer during changing the firmware till "POWER and ERROR LED" are synchronously blinking. Otherwise unpredictable results may occur.

3. The binary file downloaded to CX400 for updating the F/W in corrupted case must be led with the prefix commands. "Prefixed commands + binary data" can be sent to CX400 by entering " Copy <prefix Commands file>+< Binary Data file> LPT1: " in DOS prompt.

The syntax of Prefix is :

<Prefix >: 0x1B+0x24+0x33+"Start offset(1 byte)"+"Data Count(1 byte)"

"Start offset" ➔ *To Define the Starting offset for programming the On-Board Flash ROM. The actually Starting Offset is got by multiplying "Start offset(1 byte)" with (2** 16). By the way CHIP ERASE is performed only when "Start Offset"is set to zero.*

"Data Count" ➔ *To Define the Data Count in the following Binary Data. The actually Data Count is got by multiplying "Data Count" with (2** 14).*

< e.g. >

1. *0x1B+0x24+0x33+0x00+0x04 + " Binary Data programmed on Flash ROM"*
   ➔ *Send the above data to Printer, then thhe Binary Data will be stored on Flash ROM from offset 0x000000 to 0x00ffff.*

2. *0x1B+0x24+0x33+0x20+0x40 + " Binary Data programmed on Flash ROM"*
   ➔ *The Binary Data will be stored on Flash ROM from 0x200000 to 0x2fffff.*

3. *0x1B+0x24+0x33+0x00+0x80 + "Binary Data programmed on Flash ROM".*
   ➔ *The Binary Data will be stored on Flash ROM*

8. Maintenance and Trouble Shooting

8.1 Printer status indication

The printer has built-in monitors for the status. The status and error indications will be displayed on the front panel LED indicators. Generally, when a malfunction or an abnormal condition being detected, the ERROR LED will blink. Tab. 8.1 below shows the LED indications corresponding to various errors.

LED Indication	Description
ERROR LED are synchronously blinking with POWER LED (on & off in the same time)	Indicate " Fail to detect Media Index or Media out".
ERROR LED is Blinking in the opposite way with POWER LED	Ribbon Error
ERROR LED is ON and OFF alternatively and the OFF period is longer than ON, when POWER LED being ON.	Print Head Open.
"POWER LED ON and ERROR LED blinking at 50 % duty cycle	RS232 error.

Table 8.1

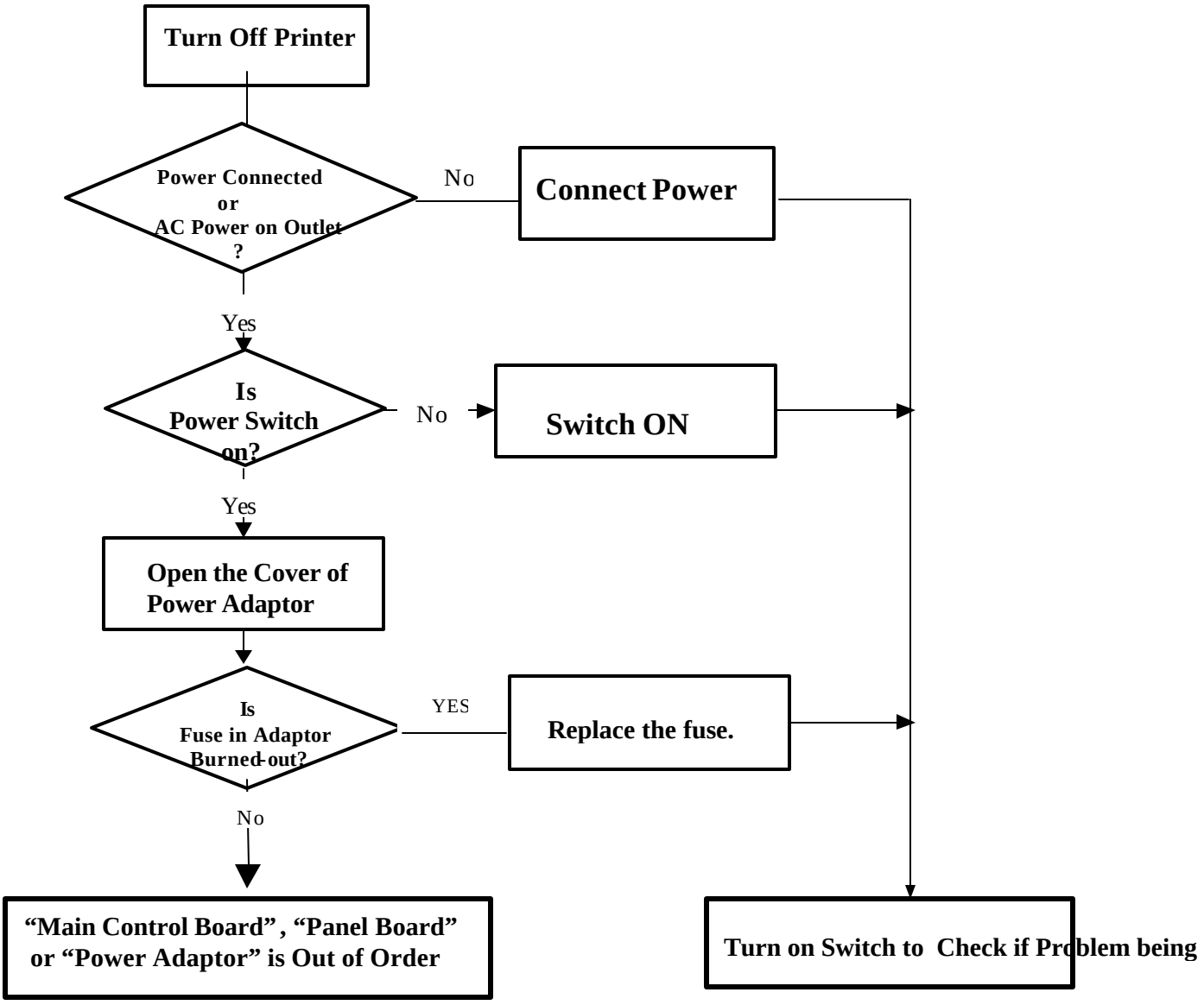
CAUTION

The printer electronics are susceptible to static discharge . Wear an anti-static wrist and attach it to the printer chassis

8.2 Trouble Shooting

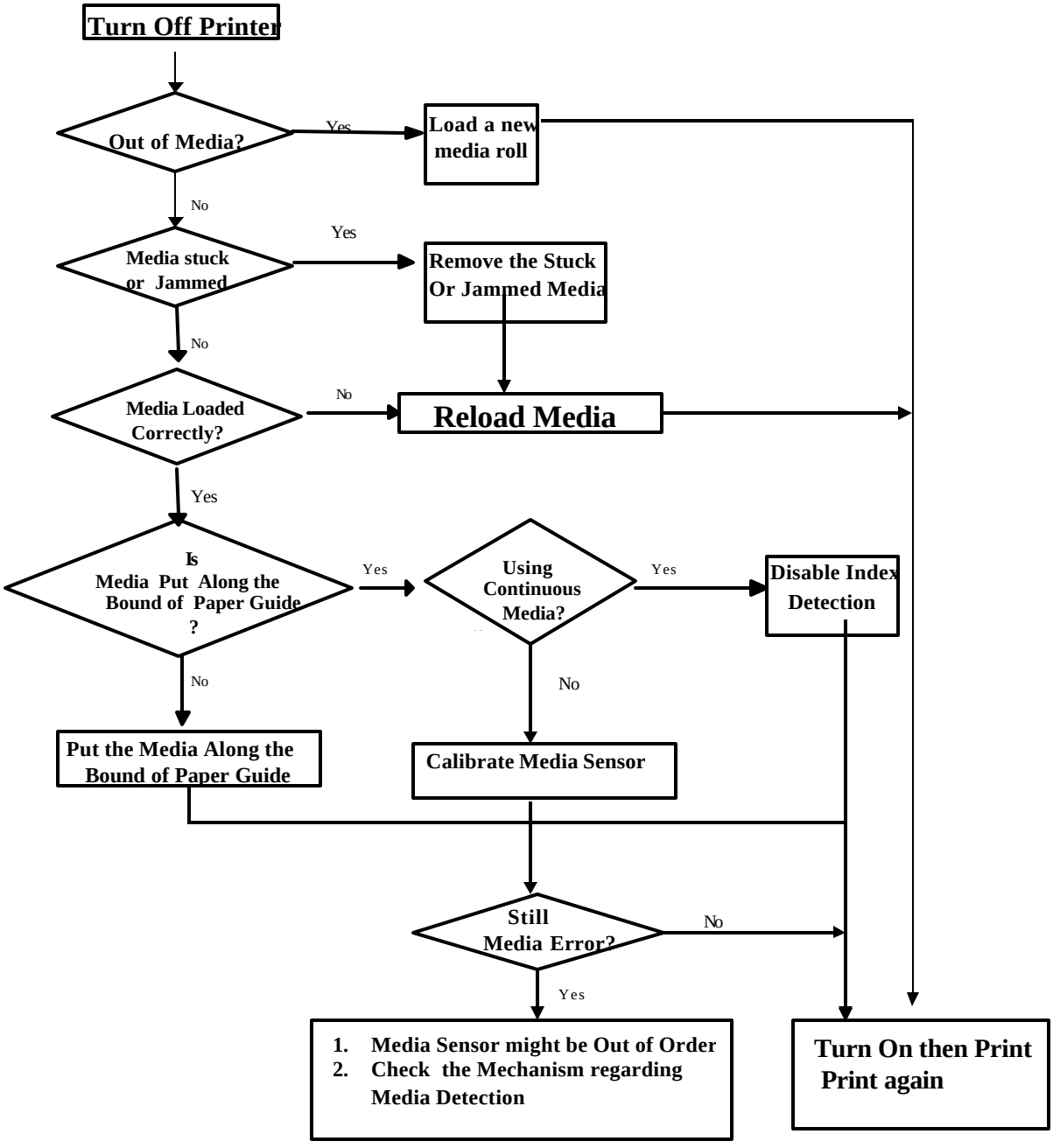
< I. Power Fail >

LED Indication	Status	Cause
Both Power & Error are Off	No Power	1. No Power Supplied 2. The fuse in Adaptor was burned out 3. Printer might be out of order. "Main board " or " Panel Board " Bad 4. Adaptor might be Bad



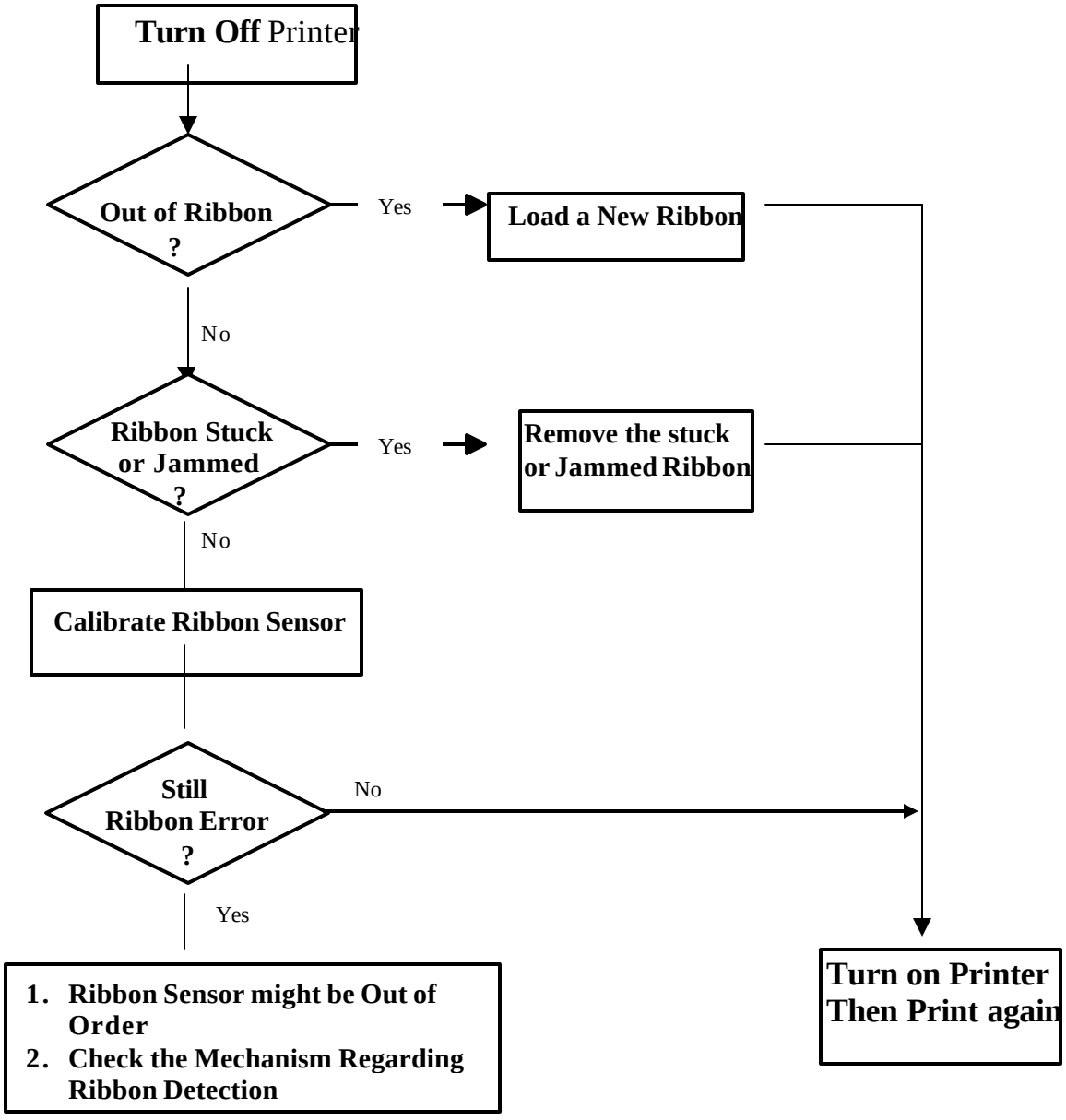
< II. Media Error >

LED Indication	Status	Cause
ERROR LED is synchronously blinking with POWER LED	Media Error	1. Media out (No Media detected) 2. Media Jammed 3. Special Media. Need Calibration 4. Media Sensor might be out of order



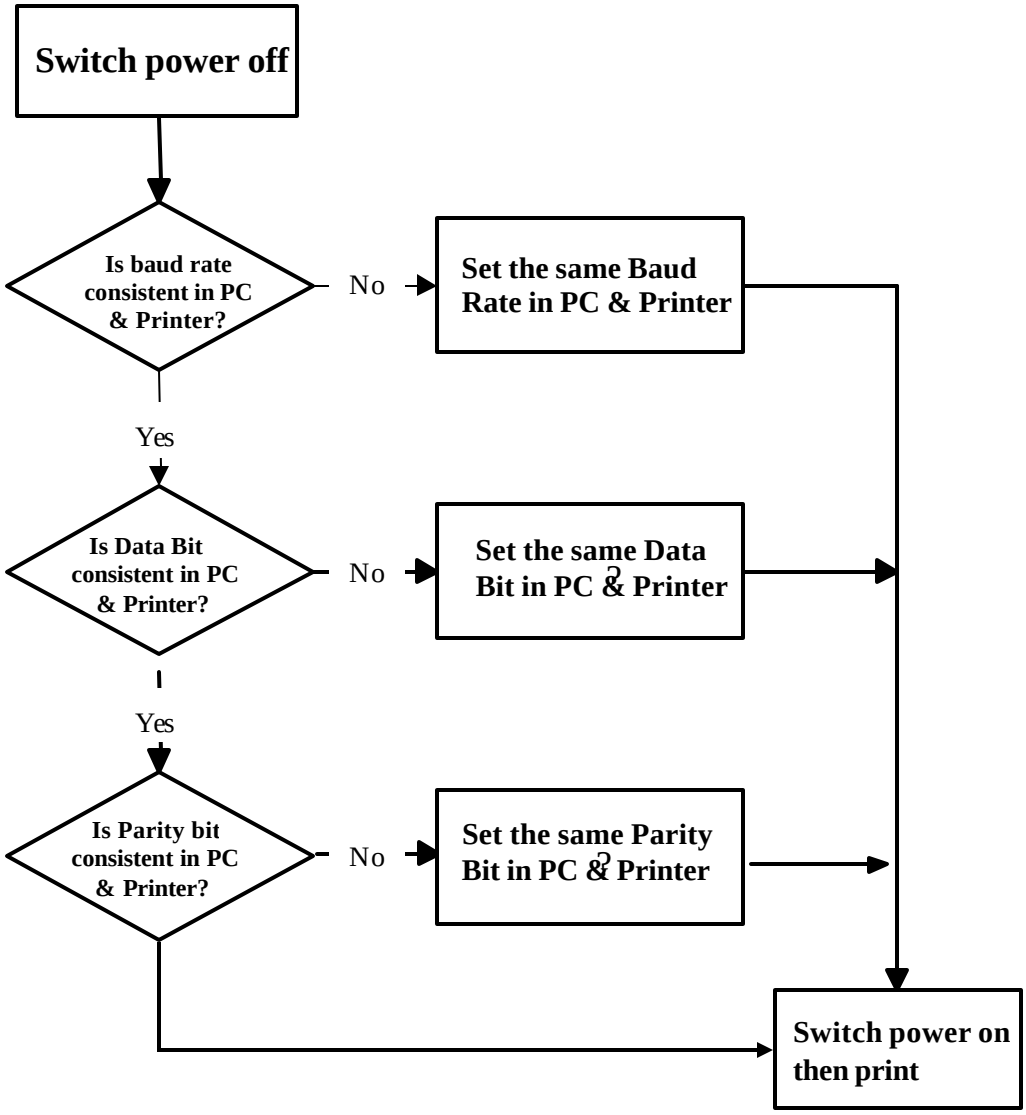
< III. Ribbon Error >

LED Indication	Status	Cause
ERROR LED is blinking in the opposite way with POWER LED	Ribbon Error	1. Ribbon out 2. Ribbon Stuck 3. Special Ribbon & Media. Need Calibration. 4. Ribbon Sensor might be out of order



< III.. RS232 Error >

LED Signal	Status	Cause
"POWER LED ON" and "ERROR LED blinking at 50 % duty cycle "	RS232 Error	1. The Settings for RS232 between Host & Printer are not consistent


Switch power off
Is baud rate consistent in PC & Printer?
No
Set the same Baud Rate in PC & Printer
Yes
Is Data Bit consistent in PC & Printer?
No
Set the same Data Bit in PC & Printer
Yes
Is Parity bit consistent in PC & Printer?
No
Set the same Parity Bit in PC & Printer
Switch power on then print

8.3 Clearance

CAUTION

The printer electronics are susceptible to static discharge. Wear an anti-static wrist and attach it to the printer chassis

There are some components need to be clean-up occasionally :

Thermal print head

The debris of thermal paper or ribbon may be remained on the print head. This will cause the printed image (Characters, Bar Code …)to appear light or faded . To clean the print head, wet a soft paper towel with "isopropyl rubbing alcohol" and use the damp towel to rub off the dirt on the print head surface .
It is recommended to clean "Print Head" before a new ribbon being loaded.

Platen roller :
If the roller becomes contaminated with grit, label adhesive, or ink, the printing quality may be adversely affected. To clean the roller , using a clean cloth and alcohol, wipe off any accumulated debris .

Note : Switch off the power before cleaning !

8.4 Replacement

8.4.1 Printing Head(TPH) Replacement

CAUTION

The printer electronics are susceptible to static discharge. Wear an anti-static wrist and attach it to the printer chassis

1. Turn Off Printer
2. Push “Print Head module” and pull it down as the 2 arrows shown in Fig. 9.1 to release “Print Head module” from “Printer Chassis”(30).
3. Loose the 4 screws(C) to take out Print Head from “Print Head Module “(12 ,13).

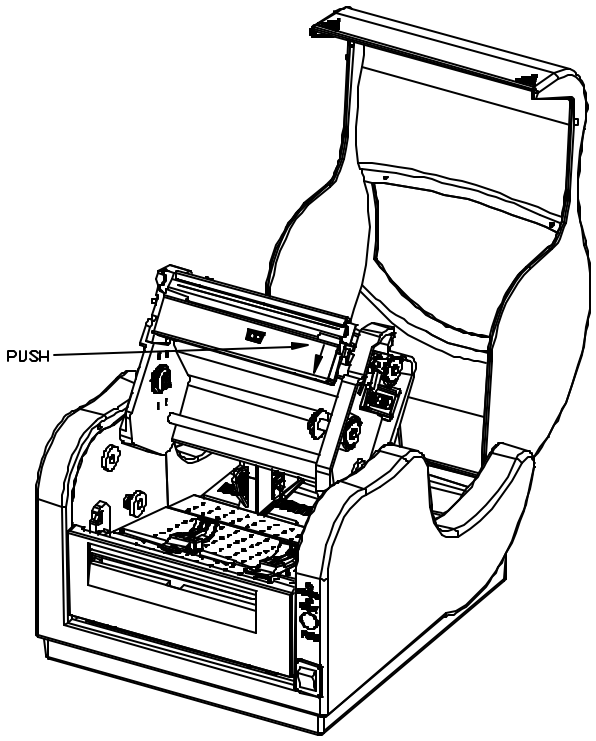


Figure 8.1

4. Unplug the 2 Print Head cables from the connectors on Print Head to take off the old Print Head.
5. Plug the 2 Print Head cable to the new Print Head.
6. Screw the new Print Head on “Print Head module”(12,13) .
7. Put back new “Print Head module” on “Printer Chassis”(30) with the same way which you released it from “Printer Chassis”

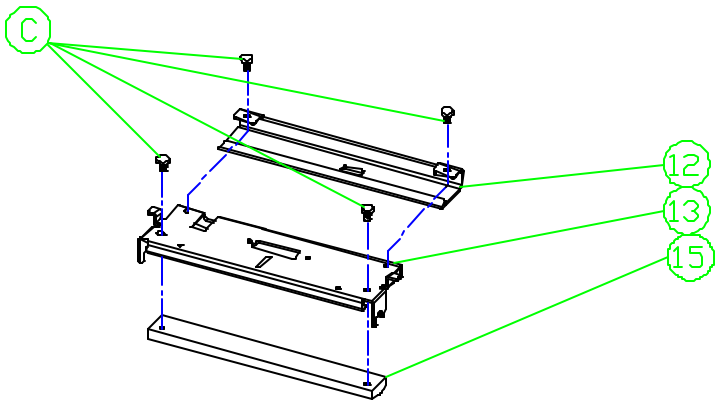


Figure 8.2

8.4.2 Main-Board Replacement

1. Turn off Printer
2. Loose the 2 screws(B) to take off “Peeler Cover”(75).

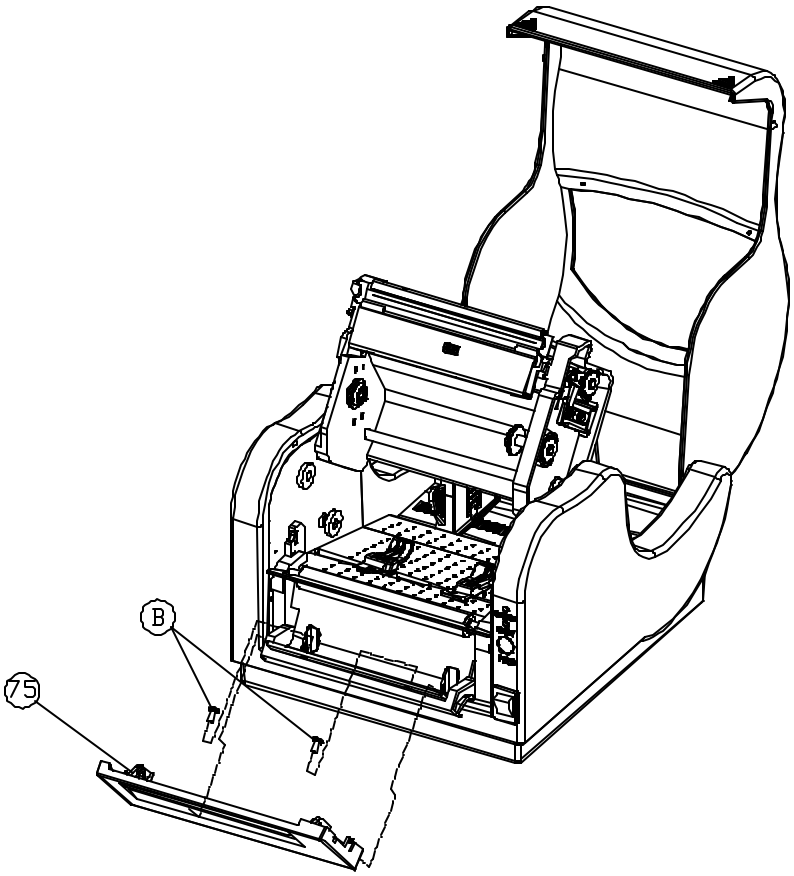


Figure 8.3

3. Loose 2 screws(I) on Printer Bottom(39).
4. Pull out the front side of "Middle Cover" (96), then remove it from "Printer Bottom" (39).
5. Use a proper screw driver (I type, as sharp as possible) to loose "Power Switch" which is locked on "Middle Cover"(96).
6. Unplug "Power Switch" from "Power Cords" then take out "Middle Cover" (96).

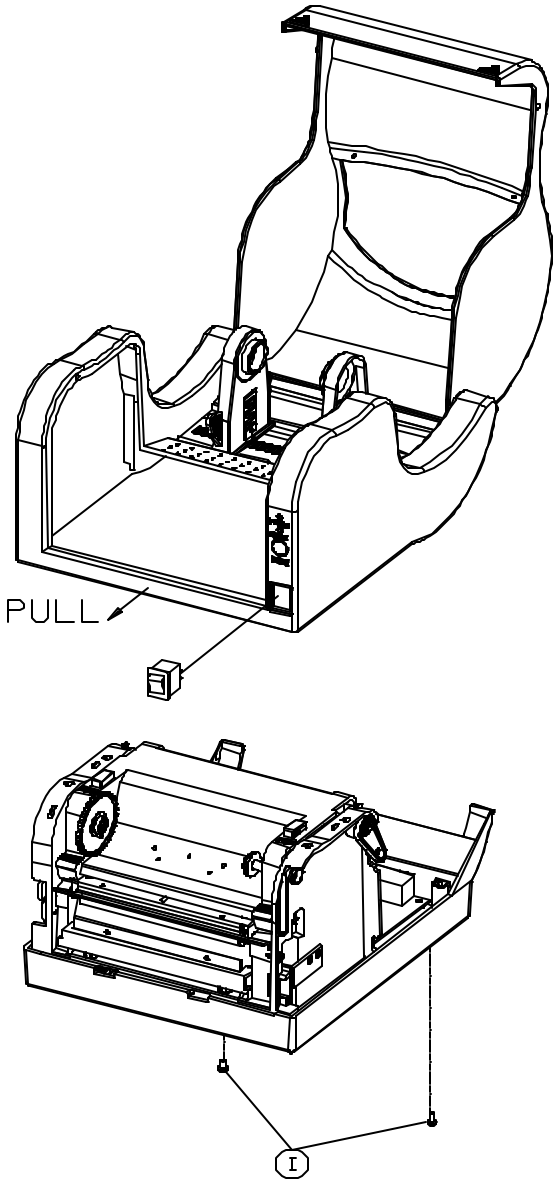


Figure 8.4

7. Loose 4 screws (E).
8. Unplug all the connectors which connected on Main Board . Then take out the “Printer Chassis” (30) .
9. Loose those 4 screws (B) which fixed Main-Board (80) on Bottom (39). Then take out the Bad Main-Board.
10. Put the new main on Bottom(39). Then Screw up those 4 screws (B) on Printer Bottom (39).
11. Plug the female connectors, which attached on “Printer Chassis”(30) with cables, into the corresponding male connectors (Its color & Pin Count are identical with the female connector) on Main Board.
12. Put “Printer Chassis”(30) on Bottom(39).
13. Screw up 4 screws (E) to fix “Printer Chassis” (30) on Bottom(39).
14. Let the 2 Power Cords go through the switch hole on “Middle Cover”(96), then plug “Power Cord” to Power Switch.
15. Pull the front side of “middle cover” to put it back on “Bottom” (39).
16. Screw up the 2 screws(I) on Printer Bottom .
17. Screw up the 2 screws(B) to install “Peeler Cover”(75) on “Printer Chassis”(30).
18. Press and click “Power Switch” into the switch hole on “Middle Cover”(96).

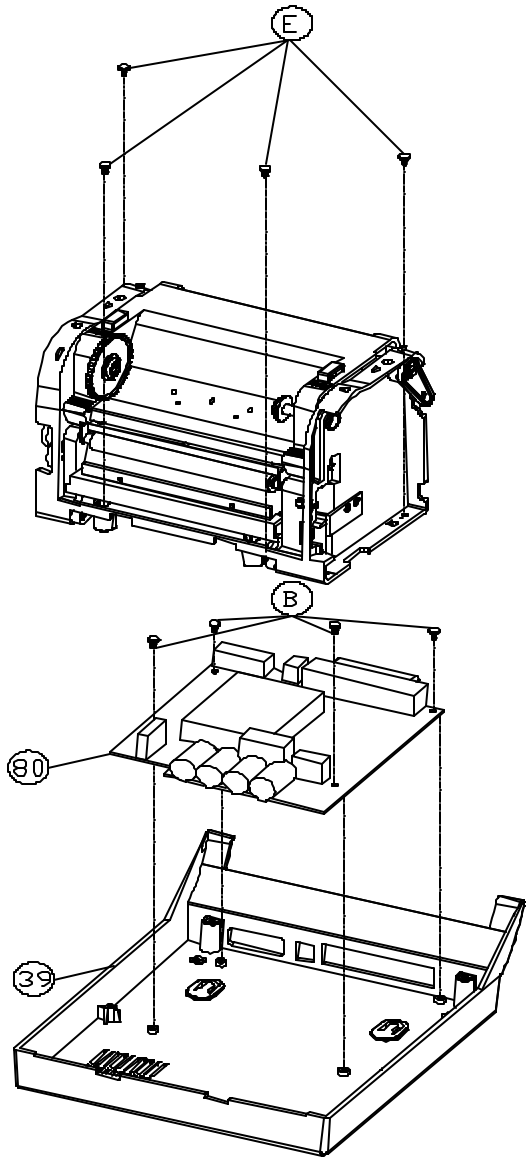


Figure 8.5

8.4.3 Roller Replacement

1. Turn off Printer
2. Loose the 2 screws(B) to take off "Peeler Cover"(75).
3. Loose the screw (E) which screwed "ANG-PEELER" (28) to "Printer Chassis"(30).
4. Push "ANG-PEELER"(28) to right then take it out.

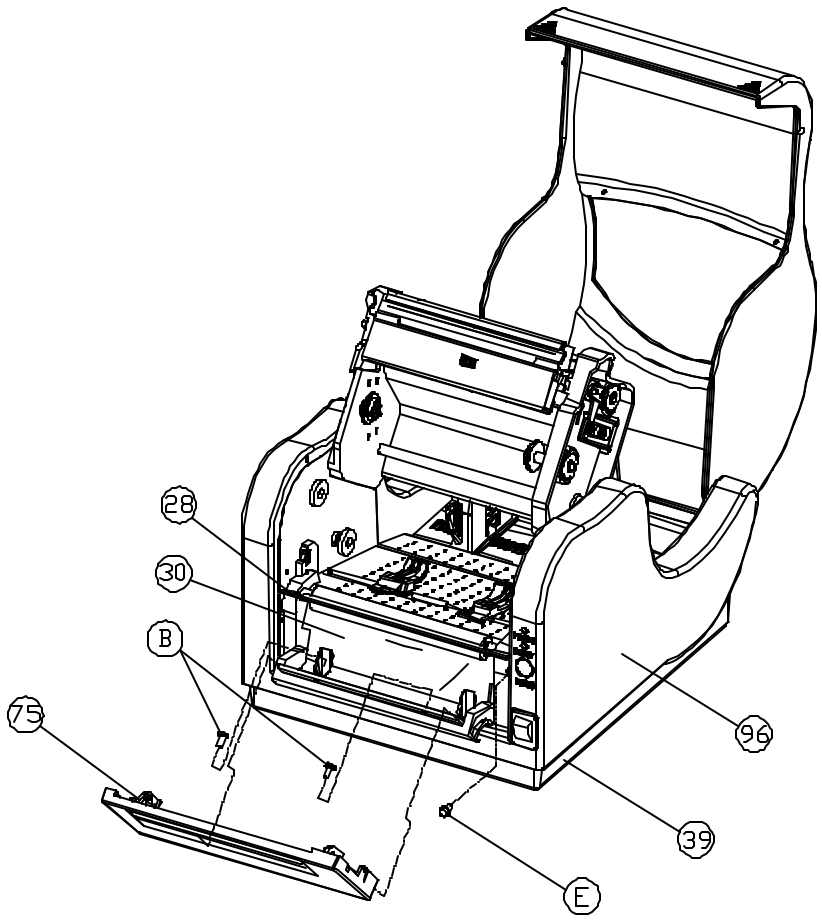


Fig. 8.6

5. Loose 2 screws(I) on 'Printer Bottom' (39).
6. Pull out the front side of "Middle Cover" (96), then remove it from "Printer Bottom" (39).
7. Use a proper screw driver (I type, as sharp as possible)to loose "Power Switch" which is locked on "Middle Cover"(96).
8. Unplug "Power Switch" from "Power Cords" then take out "Middle Cover" (96).

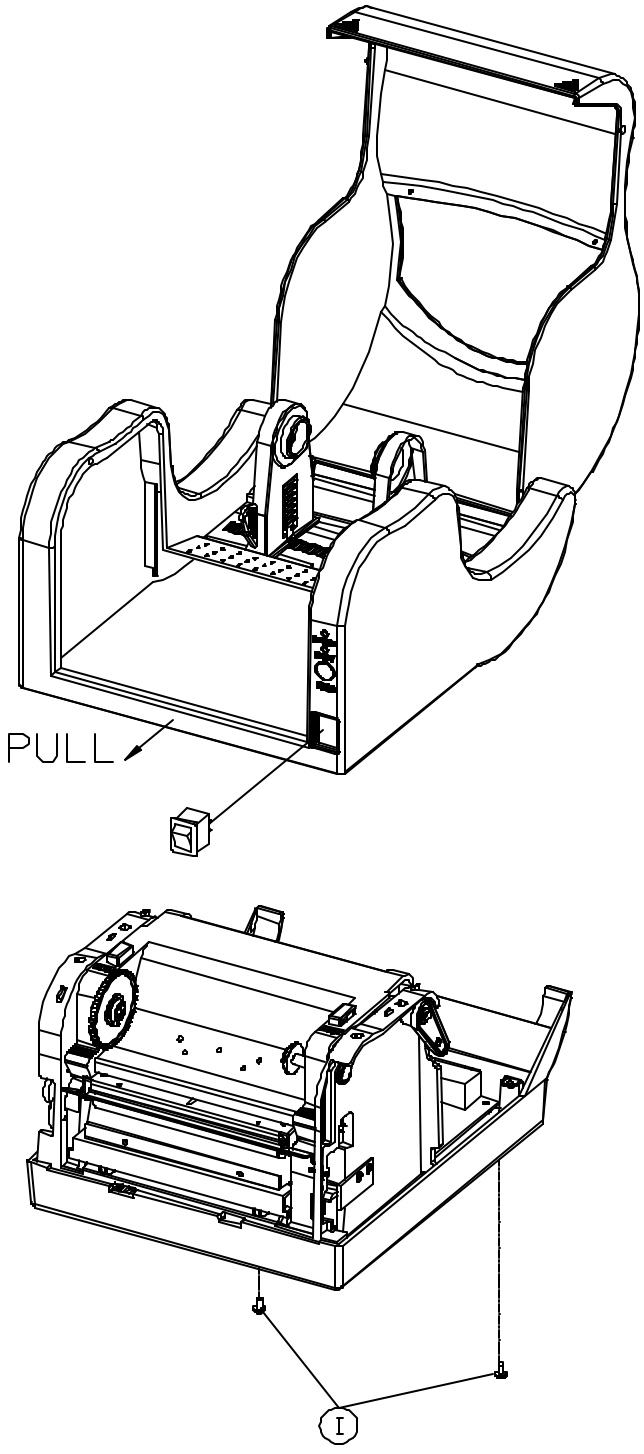


Fig. 8.7

9. Take out " E Ring (X)" to remove Gear (67) .
10. Loose Screw (B).
11. Take out the 2 "BUSH -ROOLER" (26) which ringed the ROLLER (27) shaft .
12. Move ROLLER (27) to the most left side then pull it out. Then take out the BUSH-ROLLER (26) which is adhered to the Right Shaft of ROLLER(27).
13. Put the BUSH -ROLLER, which take out from step 11,into the right shaft (Shorter one) of new ROLLER.
14. Put the Left Shaft of new ROLLER (27)(Longer shaft) into the Roller Hole at the left side of "Printer Chassis", then push the right Shaft(Shorter Shaft) into the Roller Hole at the right side of "Printer Chassis"(30).
15. Put 2 BUSH-ROLLER (26) into the left Shaft of New ROLLER (27)
16. Fix New "ROLLER"(27) in "Printer Chassis"(30) with Screw (B).
17. Put back Gear (67) then fix it with "E ring ".
18. Let the 2 Power Cords go through the switch hole on "Middle Cover"(96), then plug "Power Cord" to "Power Switch".
19. Pull the front side of "middle cover" to put it back on "Bottom" (39).
20. Screw up 2 screws(I) on Printer Bottom.
21. Push righ "ANG-PEELER"(28) to put it into "Printer Chassis"(30).
22. Fix "ANG-PEELER" to "Printer Chassis"(30) with "SCREW (E)" .
23. Screw up 2 screws(B) to fix "Peeler Cover"(75) on "Printer Chassis"(30).
24. Press and click "Power Switch" into the switch hole on "Middle Cover"(96).

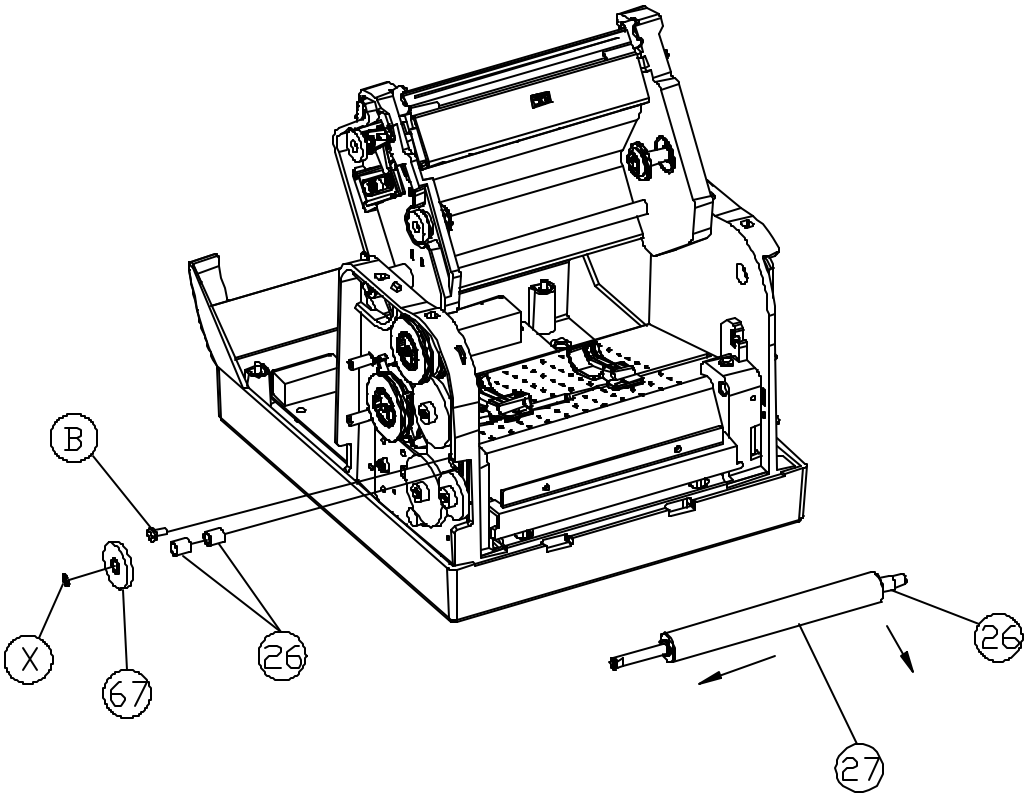


Fig. 8.8

9. OPERATIONAL THEOREM

9.1 System block diagram

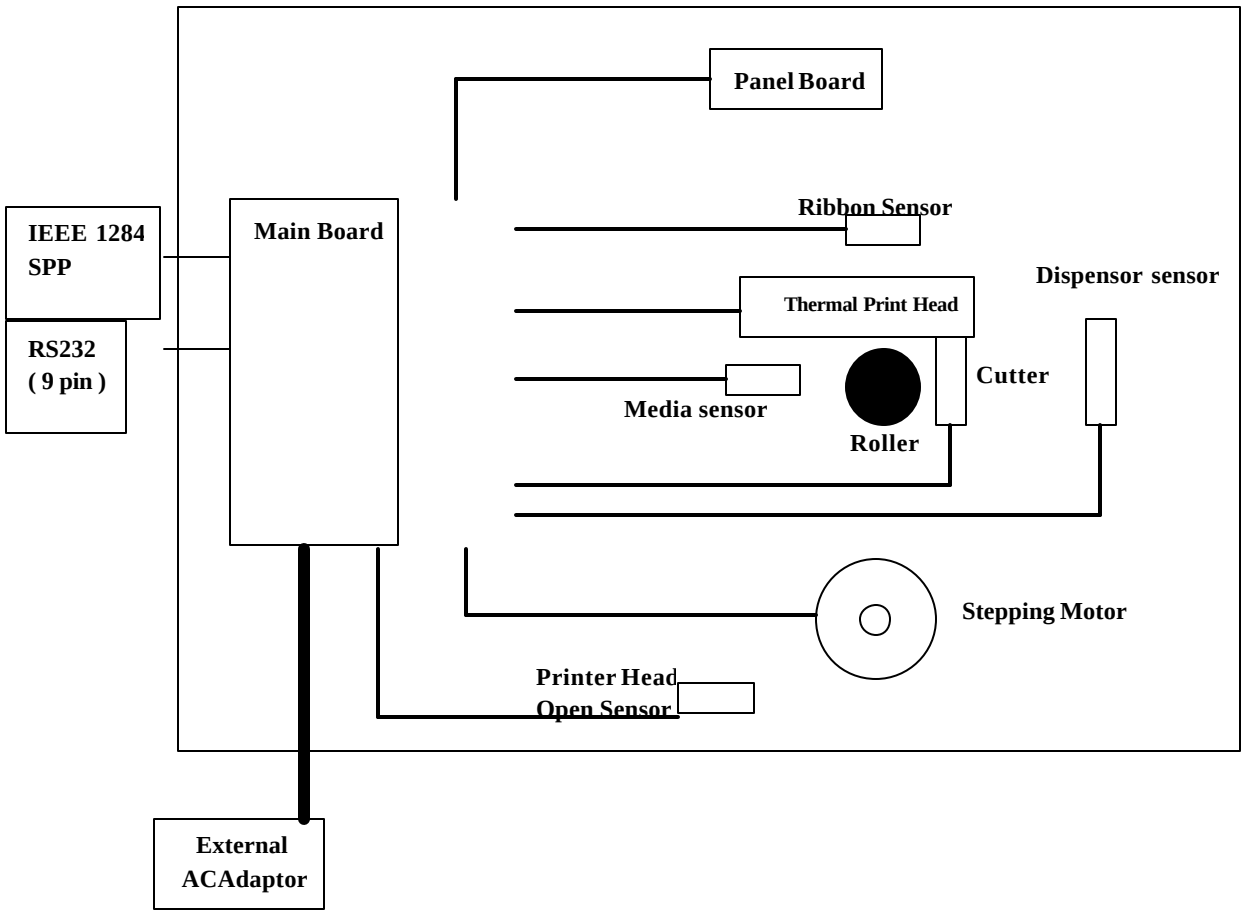


Figure 9.1 CX400 System Block Diagram

The major modules in CX400 are,

Main board :
A four layers PCBA ,which consists of a micro-controller ,Flash ROM ,EEPROM , DRAM …… components required for the printing functions.

Panel board :
A 2 layers PCBA consists of one push button switches and two LED indicators.

Ribbon sensor :
A 2 layer PCBA , consists of a reflective type object sensor designate for ribbon detection.

Media sensor
A 2 layer PCBA, which consists of a reflective and see-through object sensor designates for media/gap detection.

Thermal print head (TPH)

This Print Head is consisted of 864 heat elements(800 Ohm for each element) in the printing width of 4 inches.

Stepping Motor :

The motor for feeding label and ribbon is a stepping motor with Bipolar winding & PM type. Its rotary angles in one full step is 7.5 degree.

Dispenser Sensor (option)

An two layer PCBA , consist of a reflective type object sensor designate to detect the printed label is removed or still exist .

Cutter assembly (option)

Consisting of a DC motor, relay ,gears and a rotary cutter . This cutter is able to be applied in cutting the printed label automatically.

9.2 Block Diagram of Main Control Board

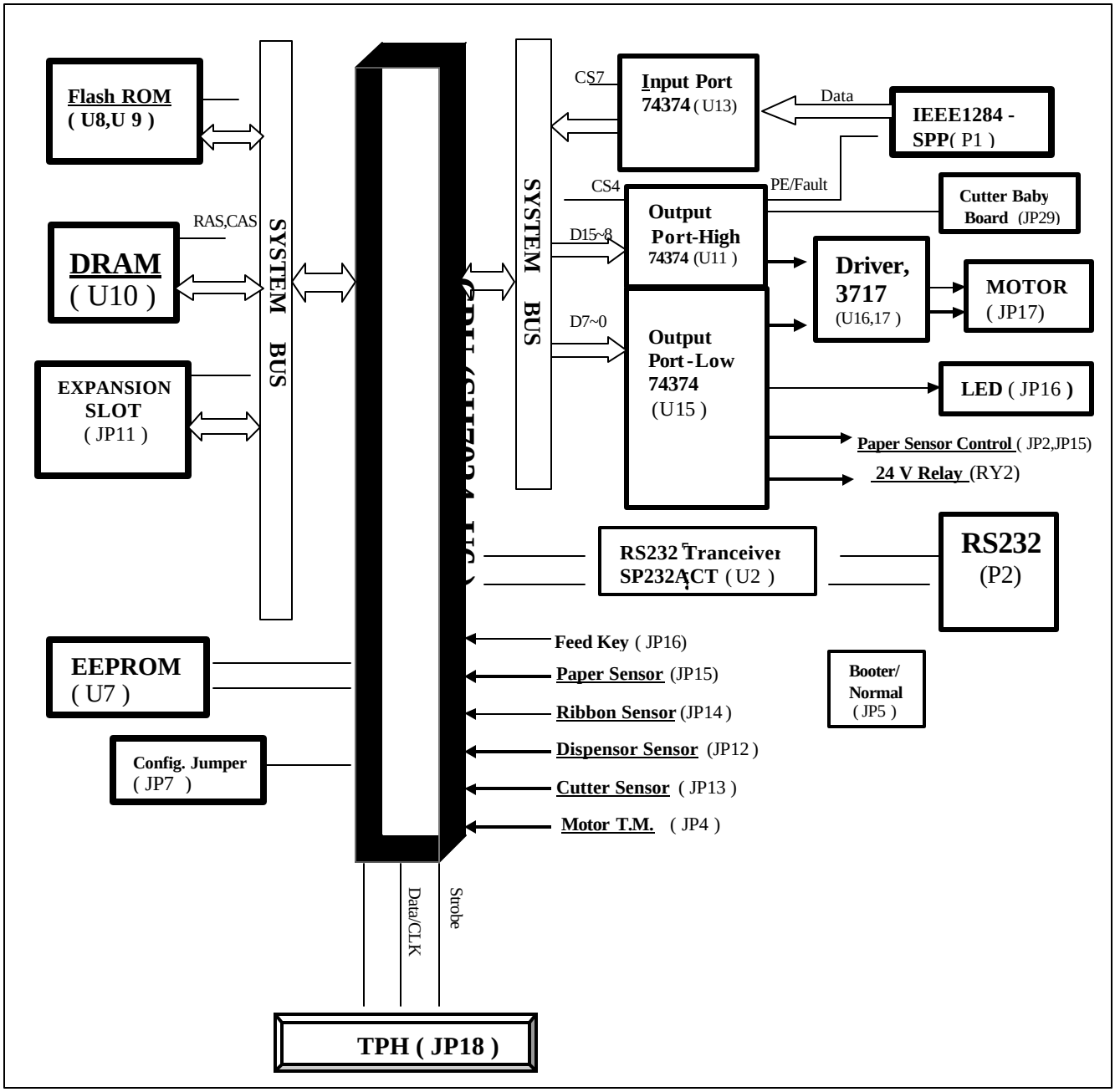


Figure 9.2

The major Components in Main Controller are:

Micro-controller (U6)

SH7034 (External 16 Bit & Internal 32 Bit in Data Bus) is based on Hitachi SH1 as its CPU Kernel and integrated with lots of on-chip peripherals which are required to build a system like this Label Printer. These rich on-chip Peripherals, Timer, DMA controller, Interrupt Controller, DRAM Controller, A/D convert , Serial communication interface, Pattern generator and I/O ports make the Electrical H/W for this printer be compact and high performance.

FLASH memory (U8,U9)
Two "one M bytes FLASH ROM" (SMD Type, Total size is 1 M x 16 bit)are put on the main board to store the firmware, character and bar code fonts.

DRAM (U10)
An one M word EDO DRAM(1 M x16 bits) is put on the Main Board. Normally the volatile data, like working buffers and Parameters, are allocated here. The controlling signals for EDO DRAM are provided by the DRAM controller built in SH-7034.

EEPROM (U7)
EEPROM is the memory device to save the parameters, which could be set by user and should be permanently retained. The total size of EEPROM on board is 1024 bit (128Byte).

RS232 Tranceiver (U4)
To convert the serial port signal to/from micro-controller to RS232 voltage level .

CENTRONICS interface (U13)
The data come from the Host (LPT Port On PC) are latched in U13(74374) then read out by the Micro-controller.

Output Ports (U11,15)
These output ports in U11& U15 are for controlling Motor, LED, Media Sensor, 24 V Relay and PE & Fault of Centronic.

DC/DC converter (U20,L1,D2)
A regulator to convert 24 V DC to 5 V DC as the Vcc source for the most of components on main board.

Motor Driver (U16,17)
These 2 ICs on U16,17 provide the mechanism to control and drive a bipolar stepping motor with chopper control of the phase current. Stepping Motor can be smoothly and properly driven forward/backward rotation by controlling "the Current levels & Driving Phase" in these 2 Driver IC.

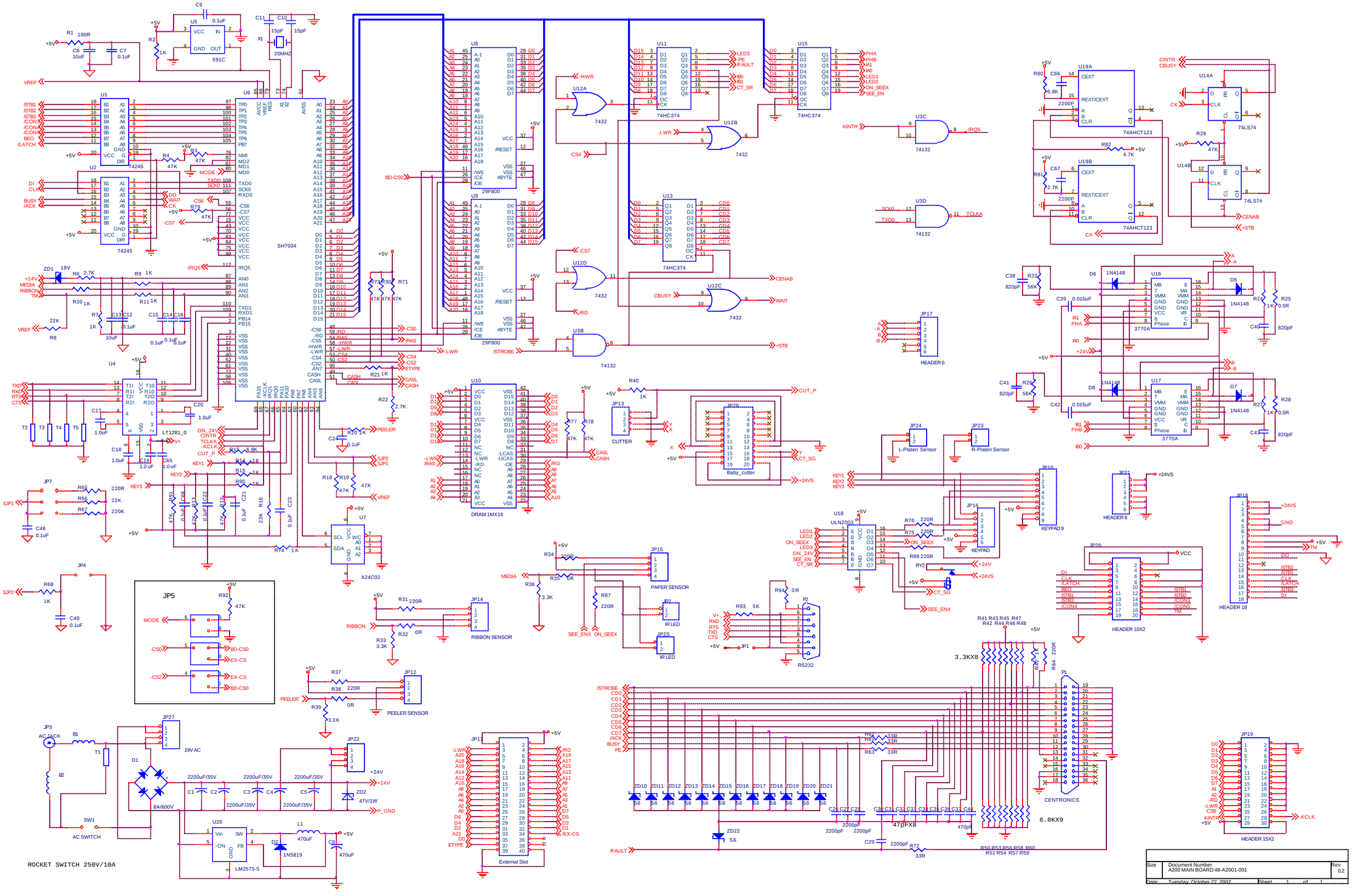
Relay (RY2)
In order to prevent the Print Head from being damaged by the unknown state in Strobe, Data-In, Clock. … of Print Head, when the printer is switched on , 24 V DC should be definitely disconnected from Print Head. RY2 provides the mechanism to disconnect "24V" with Print Head during the transient period while power being on .
For printing. image, 24 V must be applied to Print Head by controlling this Relay.

Extension slot (JP11)
This slot is designate for the connection of all the optional extension modules.

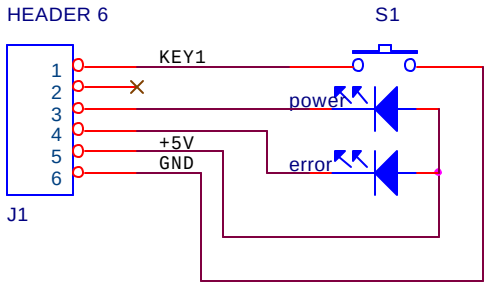
Config. Jumper (JP 7)
System Configuration Jumper

Booter/Normal (JP5)
If JP5 being set at "Normal" position, the program on the FLASH ROM(U8,U9) will be executed after power reset. On the other hand, the Program on Expansion Board will be executed firstly after power on when JP5 being set at "BOOTER" position.
In case the program & data on Flash ROM (U8,U9) are corrupted completely(even the data in boot sector are corrupted too) , the program on expansion board can be executed by CPU to upgrade a new program into on-board Flash ROM while JP5 being "BOOTER" position.
Normally JP5should be set at NORMAL position to run the program fetched from On-Board Flash ROM.

9.3 Schematic of Main Control Board

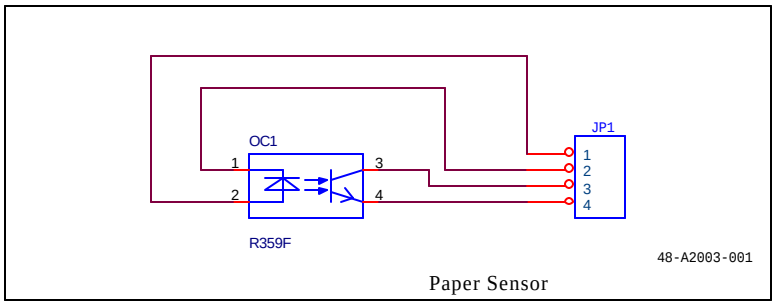

SH7034
29F800
74HC374
74245
74132
74HCT123
74LS74
3770A
DRAM 1MX16
X24C02
LT1281_0
LM2575-5
ULN2003
RS232
CENTRONICS
HEADER 6
HEADER 10X2
HEADER 18
HEADER 15X2
KEYPAD
KEYPAD 9
PAPER SENSOR
IR LED
RIBBON SENSOR
PEELER SENSOR
L-Platen Sensor
R-Platen Sensor
CUTTER
Baby_cutter
External Slot
ROCKET SWITCH 250V/10A
Size
Document Number
A200 MAIN BOARD 48-A2001-001
Rev
0.2
Date: Tuesday, October 22, 2002
Sheet 1 of 1

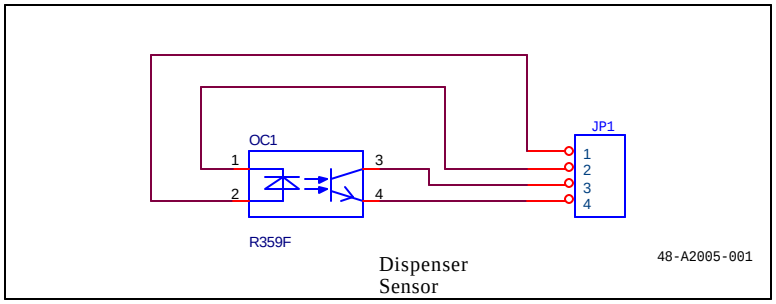
9.4 Schematic of Panel Board

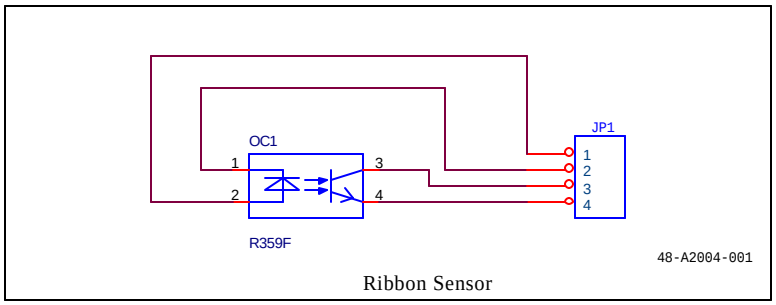


9.5 Schematic of Various Sensor Boards

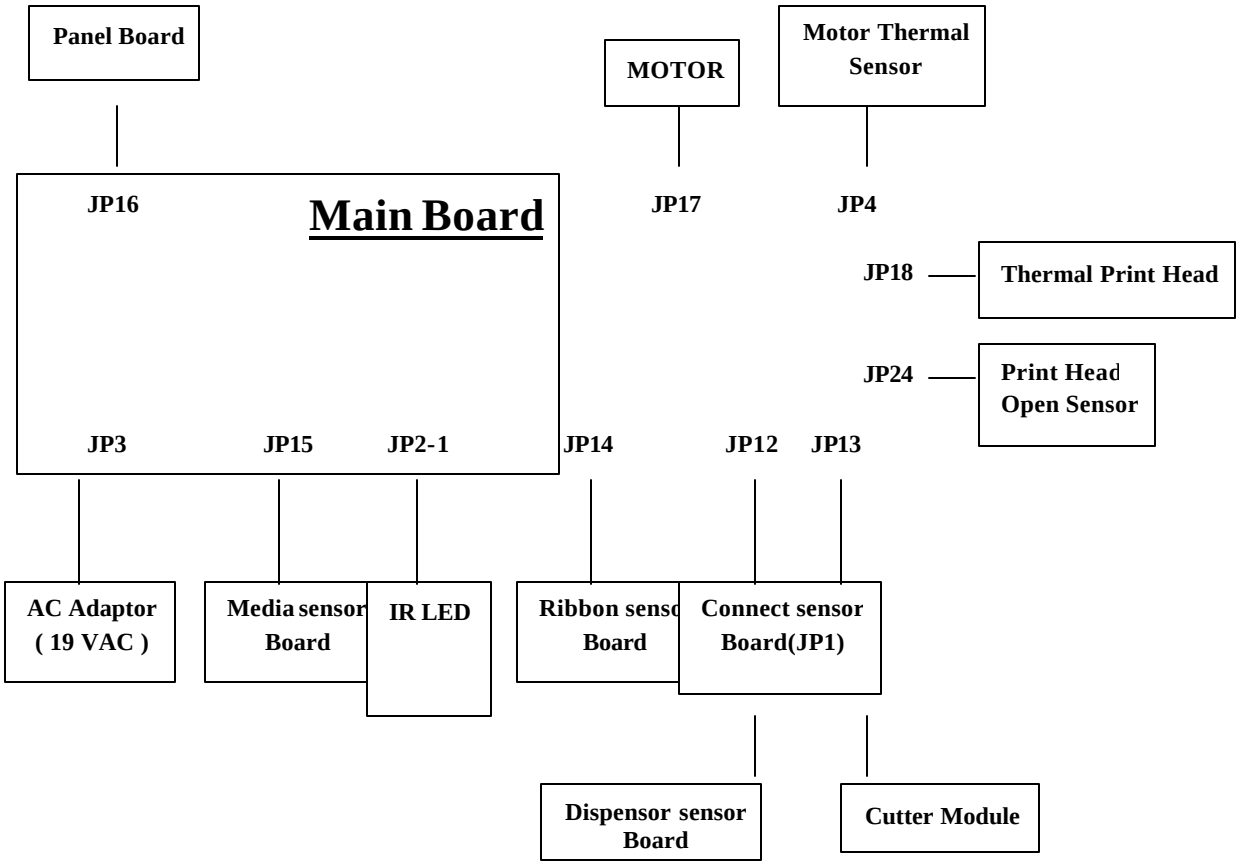
The circuit of all the sensor board (Media sensor board, Ribbon sensor board and Dispensor board) are identical but only being different in lay out



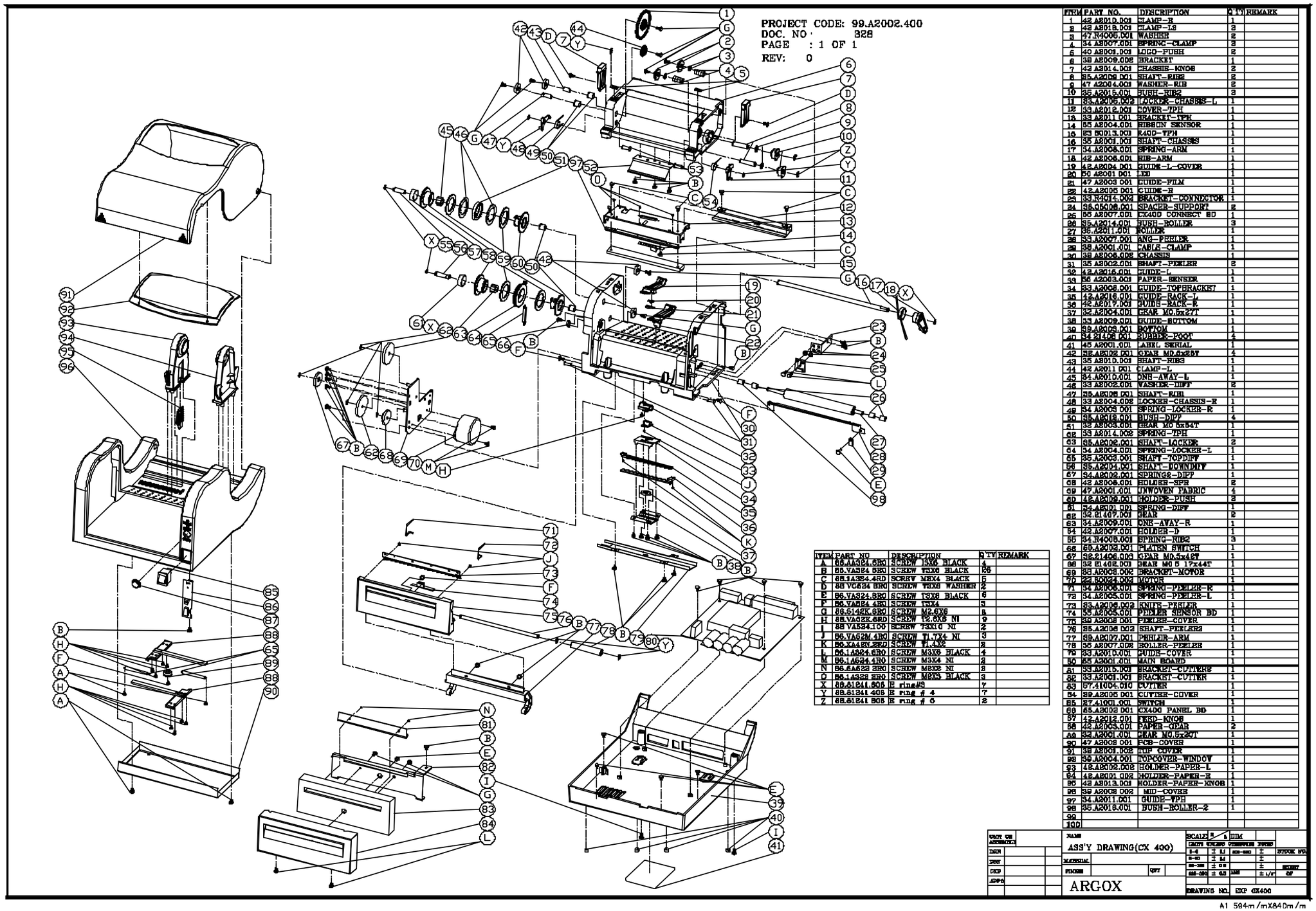




9.6 Wiring Diagram



9.7 Exploded Drawing



ITEM	PART NO.	DESCRIPTION	Q'TY	REMARK
1	42 A2010.001	CLAMP-R	1	
2	42 A2018.001	CLAMP-LS	2	
3	47.R4005.001	WASHER	2	
4	34 A2007.001	SPRING-CLAMP	2	
5	40 A2002.001	LOCK-PUSH	2	
6	38 A2009.002	BRACKET	1	
7	42 A2014.001	CHASSIS-KNOB	2	
8	35.A2009.001	SHAFT-RIB2	2	
9	47 A2004.001	WASHER-RIB	2	
10	35.A2015.001	BUSH-RIB2	2	
11	33.A2006.002	LOCKER-CHASSIS-L	1	
12	33.A2012.001	COVER-TPH	1	
13	33 A2011.001	BRACKET-TPH	1	
14	35 A2004.001	RIBBIN SENSOR	1	
15	25 SD013.001	KNOB-TPH	1	
16	35 A2001.001	SHAFT-CHASSIS	1	
17	34.A2008.001	SPRING-ARM	1	
18	42 A2006.001	RIB-ARM	1	
19	42.A2004.001	GUIDE-L-COVER	1	
20	50 A2001.001	LED	1	
21	47 A2003.001	GUIDE-FILM	1	
22	42.A2005.001	GUIDE-R	1	
23	33.R4014.002	BRACKET-CONNECTOR	1	
24	58.05008.001	SPACER-SUPPORT	2	
25	55 A2007.001	CX400 CONNECT BD	1	
26	35.A2014.001	BUSH-ROLLER	3	
27	36.A2011.001	ROLLER	1	
28	53.A2007.001	ANG-PEELER	1	
29	38.A2001.001	CABLE-CLAMP	1	
30	38 A2008.002	CHASSIS	1	
31	35 A2002.001	SHAFT-PEELER	2	
32	42.A2016.001	GUIDE-L	1	
33	55 A2003.001	PAPER-SENSER	1	
34	33.A2008.001	GUIDE-TOPBRACKET	1	
35	42.A2016.001	GUIDE-RACK-L	1	
36	42.A2017.001	GUIDE-RACK-R	1	
37	32.A2004.001	GEAR M0.5x27T	1	
38	33.A2009.001	GUIDE-BUTTOM	1	
39	99.A2002.001	BOTTOM	1	
40	34.21408.001	RUBBER-FOOT	4	
41	45 A2001.001	LABEL SERIAL	1	
42	58.A2002.001	GEAR M0.5x25T	4	
43	35 A2010.001	SHAFT-RIB3	1	
44	42 A2011.001	CLAMP-L	1	
45	34.A2010.001	ONE-AWAY-L	1	
46	33 A2002.001	WASHER-DIFF	2	
47	35.A2008.001	SHAFT-RIB1	1	
48	33 A2004.002	LOCKER-CHASSIS-R	1	
49	34 A2005.001	SPRING-LOCKER-R	1	
50	35.A2013.001	BUSH-DIFF	4	
51	32 A2003.001	GEAR M0.5x54T	1	
52	33 A2014.002	SPRING-TPH	1	
53	35.A2002.001	SHAFT-LOCKER	2	
54	34 A2004.001	SPRING-LOCKER-L	1	
55	35.A2003.001	SHAFT-TOPDIFF	1	
56	35.A2004.001	SHAFT-BOTTOMDIFF	1	
57	34.A2002.001	SPRING2-DIFF	1	
58	42 A2004.001	HOLDER-SPR	2	
59	47.A2001.001	UNWOVEN FABRIC	4	
60	42.A2002.001	HOLDER-PUSH	2	
61	34.A2001.001	SPRING-DIFF	1	
62	32.21407.001	GEAR	2	
63	34.A2009.001	ONE-AWAY-R	1	
64	42.A2007.001	HOLDER-D	1	
65	34.R4005.001	SPRING-RIB2	3	
66	60.A2002.001	PLATEN SWITCH	1	
67	32.21406.003	GEAR M0.5x42T	1	
68	32 21402.001	GEAR M0.5 17x44T	1	
69	38.A2008.002	BRACKET-MOTOR	1	
70	22.R0024.002	MOTOR	1	
71	34.A2006.001	SPRING-PEELER-R	1	
72	34.A2005.001	SPRING-PEELER-L	1	
73	33.A2005.002	KNIFE-PEELER	1	
74	55.A2005.001	PEELER SENSOR BD	1	
75	39 A2008.001	PEELER-COVER	1	
76	35.A2006.002	SHAFT-PEELER2	1	
77	58.A2007.001	PEELER-ARM	1	
78	35.A2007.002	ROLLER-PEELER	1	
79	33.A2010.001	GUIDE-COVER	1	
80	55.A2001.001	MAIN BOARD	1	
81	33.A2015.001	BRACKET-CUTTER2	1	
82	33.A2001.001	BRACKET-CUTTER	1	
83	57.41054.010	CUTTER	1	
84	39.A2005.001	CUTTER-COVER	1	
85	57.41001.001	SWITCH	1	
86	55.A2002.001	CX400 PANEL BD	1	
87	42.A2012.001	FEED-KNOB	1	
88	42.A2003.001	PAPER-GEAR	2	
89	32.A2001.001	GEAR M0.5x20T	1	
90	47 A2002.001	PCB-COVER	1	
91	39 A2001.002	TOP COVER	1	
92	39.A2004.001	TOP-COVER-WINDOW	1	
93	42.A2002.002	HOLDER-PAPER-L	1	
94	42.A2001.002	HOLDER-PAPER-R	1	
95	42 SD13.001	HOLDER-PAPER-KNOB	1	
96	39 A2008.002	MID-COVER	1	
97	34.A2011.001	GUIDE-TPH	1	
98	35.A2016.001	BUSH-ROLLER-2	1	
99				
100				

ITEM	PART NO	DESCRIPTION	Q'TY	REMARK
A	66.AA324.630	SCREW M3X6 BLACK	4	
B	66.VA324.630	SCREW M3X6 BLACK	26	
C	66.14324.4RD	SCREW M4X4 BLACK	5	
D	66 VC324 830	SCREW M3X6 WASHER	2	
E	66.VA324.630	SCREW T3X6 BLACK	6	
F	66.VA324.430	SCREW T3X4	3	
G	66.61428K.630	SCREW M2.6X6	8	
H	66.VA326K.6RD	SCREW T2.6X6 NI	9	
I	66 VA534.100	SCREW T3X10 NI	2	
J	66.VA52M.4R0	SCREW T1.7X4 NI	3	
K	66.XA48N.2R0	SCREW T1.4X2	2	
L	66.14324.6R0	SCREW M3X6 BLACK	4	
M	66.14624.4R0	SCREW M3X4 NI	2	
N	66.AA322.2R0	SCREW M3X2 NI	2	
O	66.14328.5R0	SCREW M3X5 BLACK	3	
X	68.61241.605	E ring#5	7	
Y	68.61241.405	E ring # 4	7	
Z	68.61241.505	E ring # 5	2	

UNIT OF ASSEMBLY		NAME	ASS'Y DRAWING(CX 400)	SCALE 1/1 UNIT
DSN		MATERIAL		DECS UNLESS OTHERWISE NOTED
DRN		FINISH	QTY	0~6 ± 0.5 6~30 ± 0.8 30~120 ± 1.2 120~400 ± 1.5 400~1000 ± 2.5 1000~ ± 4.0
CKD				STOCK NO.
APPD		ARGOX		WEIGHT KG
			DRAWING NO. EXP CX400	A1 594mm/mX840mm/m

10. "Major" & "Recommended Spare" Parts

Major Parts

part number	description
55-A2001-001	CX400 Main board
55-A2002-001	CX400 Panel board
55-A2003-001	CX400 Paper sensor board
55-A2004-001	CX400 Ribbon sensor board
71-07034-165	Hitachi HD6437034F20,20MHz
23.80013.001	Thermal print head
50.A2002.001	Set of CX400 IR LED Cable
50-A2003.001	Set of Motor Thermister for cx400
50-A2002-001	Set of Platen Switch Cable for CX400
98-21402-101	Power Adaptor ,110 V
98-21401-051	Power Adaptor, 230 V ,CE
98-20402-103	Power Adaptor for UK
98-A2002-001	Power Adaptor,230 V , TUV
22-80024-002	Stepping motor, 7.5 degree
39-A2001-001	TOP COVER
39-A2003-001	BOTTOM
39-A2004-001	TOP COVER WINDOW
39-A2002-001	MID-COVER
39-A2006-001	CHASSIS
35.A2011.001	Roller

RECOMMENDED SPARE PARTS:

part number	description
23.80013.001	200 DPI Thermal Print Head
47.A2001.001	Unwoven Fabric
35.A2011.001	Roller